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LITERATURE REVIEW: What is the Relationship between Vegetarianism and Eating Pathology? A Systematic Literature Review

EMPIRICAL PAPER: What are People's Experiences of Orthorexia Nervosa, as Described in Online Blogs?

Submitted by **Maddy Greville-Harris**, to the University of Exeter as a thesis for the degree of **Doctor of Clinical Psychology**, April 2018

Signature: 

Table of Contents

List of Tables

LITERATURE REVIEW

EMPIRICAL PAPER

List of Figures

LITERATURE REVIEW

EMPIRICAL PAPER

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SYSTEMATIC LITERATURE REVIEW

What is the Relationship between Vegetarianism and Eating Pathology?

A Systematic Literature Review

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Abstract

Recent trends in dieting have placed more emphasis on an individual's responsibility for healthy and moral eating, and seen a rise in food group elimination diets. Vegetarianism (the elimination of meat and animal products) is becoming more mainstream in the UK, yet there is debate whether vegetarianism can serve as a way of hiding disordered eating, providing an acceptable reason for food restriction and restraint. To date, there is mixed evidence as to whether there is a relationship between vegetarianism and disordered eating, and if so, what the nature of this relationship might be.

This systematic literature review aimed to look at existing research examining the relationship between vegetarianism and eating pathology. A search was carried out in four key electronic databases, and four relevant journals. 662 records were identified, and 24 (comprising 26 relevant studies) were retained after data screening. Findings suggest an increased prevalence of vegetarianism amongst eating disorder patients compared with controls, and higher rates of self-reported disordered eating amongst vegetarians compared with non-vegetarians in non-clinical samples.

Nevertheless, research to date is limited by over-reliance on convenience sampling in mainly female non-clinical populations, and poor operationalisation of vegetarianism. Future research would benefit from clearer definitions of vegetarianism and its subgroups, more qualitative research exploring individual's experiences and perspectives, and more diverse samples. Research classifying subgroups based on their motivation for restriction would

also be helpful, as it is likely that the reasons for dietary restrictions, as well as the foods that are restricted, are important in predicting eating pathology.

Keywords: Vegetarianism, Eating Pathology, Eating Disorder, Anorexia Nervosa, Bulimia Nervosa, Orthorexia Nervosa

Introduction

Trends in dieting have changed over the past few decades. An increasing idealisation of the slim or athletic body, and growing emphasis on the notion that health can be maintained through individual effort, have resulted in the rise of 'healthism' (Lee & MacDonald, 2010). This prominent social construction of health, places emphasis on the individual's responsibility for avoiding illness, achieved through "discipline and moral conduct" (Haman, Barker-Ruchti, Patriksson & Lindgren, 2015). As such, the "body becomes a metaphor for health" (Lee & MacDonald, 2010, p. 215), shaping ideas about what constitutes health and a 'healthy' diet. Perhaps partly as a result, there has been a recent interest in food group elimination diets in the United Kingdom (UK), such as sourcing organic produce only, paleo, gluten-free, lactose-free and raw food.

One widely established elimination diet is vegetarianism. Vegetarian diets are becoming increasingly popular in the UK and there is an expanding market for vegetarian goods (Rosenfeld & Burrows, 2017). According to the Vegetarian Society (2012) it is estimated that in 2012, 2% of the population in the UK were vegetarian. Vegetarianism can be categorised in terms of how strictly the diet is adhered to (Fox & Ward, 2008), with individuals identifying as semi-vegetarian, strict vegetarian or vegan (see Table 1 for definitions). Other researchers emphasise that it is not only what foods are restricted, but the reasons for such restrictions that are important (de Boer, Schösler & Aiking, 2017).

Common reasons identified for adhering to a vegetarian diet are to improve health (Curtis & Comer, 2006; Key, Appleby & Rosell, 2006), for ethical

Table 1

Types of Vegetarian Diet (Information adapted from Vegetarian Society, 2016; Corrin & Papadopoulos, 2017)

Vegetarian Diet	Description
Lacto-ovo vegetarian	Most common type of vegetarian diet. Diet excludes meat, poultry, fish but includes eggs and dairy.
Pesco-vegetarian	Diet excludes meat and poultry but includes fish, eggs and dairy.
Semi-vegetarian/flexitarian	Mainly consume a meat-free diet, but sometimes eat meat.
Lacto-vegetarian	Diet excludes meat, poultry, fish and eggs but includes dairy.
Ovo-vegetarian	Diet excludes meat, poultry, fish and dairy but includes eggs.
Vegan	Diet excludes meat, poultry, fish, dairy and eggs, or any products derived from animals.

reasons (Fessler, Arguello, Mekdara & Macias, 2003; Hoffman, Stallings, Bessinger & Brooks, 2013), and disgust of meat (Kenyon & Barker, 1998; Santos & Booth, 1996). Rosenfeld and Burrows' (2017) Unified Model of Vegetarian Identity states that dietary motivations for vegetarians are based on three kinds of goals: 1) "prosocial" (to benefit the wider world), 2) personal (to benefit oneself), or 3) "moral" (based on what is believed to be "right/wrong").

The moral positioning of food can be problematic. Barnett, Dripps & Blomquist (2016) state that current food culture positions "conventional foods" as the "bad quality" and "ethically wrong" choice, whilst "alternative foods" (such as organic, locally sourced products) are positioned as "good quality" and "ethically sound". They propose that this moral positioning of food, and resulting elimination of certain food groups, bares a "disquieting resemblance" (p. 714) to common eating disorders (EDs) such as Anorexia Nervosa (AN) and Bulimia Nervosa (BN) which position fat as "bad" and limit food intake as a result.

A new ED classification which reflects this emphasis on moral and healthy eating is Orthorexia Nervosa (ON). ON is not yet recognised as an established ED but is receiving increasing attention clinically and in research (Bratman, 2017). ON describes a pathological obsession with the quality, rather than quantity, of food (Dunn & Bratman, 2016), resulting in the rigid avoidance of 'unhealthy' foods, which may escalate to the elimination of entire food groups (Moroze et al., 2015). Thus, whilst it is possible that patients with AN and BN may eliminate food groups to control weight, patients with ON may eliminate food groups on the basis of perceived quality and purity of food.

A gap in research to date, is the exploration of the relationship between food group elimination and ED. A scoping search of elimination diets more

generally (such as gluten-free, paleo, raw food, dairy-free) revealed few studies looking at the relationship between these diets and ED. In contrast, the debate as to whether there is a link between vegetarianism and eating disorders is more established. Whilst some researchers hypothesise a relationship between adherence to vegetarian diet and the onset/maintenance of ED (Bardone-Cone et al., 2012), research evidence to date has been mixed (Timko et al., 2012).

Sullivan and Damani (2000) state that although there are many reasons for adhering to a vegetarian diet, vegetarianism does provide a plausible means for limiting food intake, and thus could be a likely starting point for individuals engaging in restrictive eating. Similarly, Barnard and Levin (2009) argue that although there is no evidence for a causal relationship between vegetarianism and EDs, vegetarianism could allow the elimination of foods in a justifiable way, as a useful method to conceal disordered eating. Whether there is an association between vegetarianism and disordered eating and the nature of this relationship, is still unclear.

This review aims to examine the evidence for an association between vegetarianism and disordered eating, and to explore the nature of this relationship. It therefore focuses on the following question: “What is the relationship between vegetarianism and eating pathology?"

Methods

Screening Procedures

Studies looking at the relationship between vegetarianism and eating pathology were examined in this review. The review included articles published in English, in peer reviewed journals from 1st January 2000 to 12th January 2018. Qualitative and quantitative studies were included in the literature search. The inclusion/exclusion criteria used to identify articles for the review are outlined in Table 2.

To ensure that this review identified journal articles that were most relevant to the research question, the PICOS approach (Preferred Reporting Items for Systematic reviews and Meta-Analyses, PRISMA statement, Liberati et al., 2009) was used to carefully define the population, intervention or exposure, comparators, outcomes and study design for studies to be included/excluded (see Table 3). Given that the onset of EDs often occurs during adolescence (Smink, Van Hoeken & Hoek, 2012), and there is increasing evidence that the age of onset of EDs is decreasing (Favaro, Caregaro, Tenconi, Bosello & Santonastaso, 2009), studies focusing on young people (aged 11 and over), as well as adults, were included in this review. In order to ensure that this review focused on the most recent and up-to-date literature in this area, articles were included which were published since 1st January 2000 up until the time of the literature search (12th January 2018).

Table 2

Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Journal articles	Books/book chapters, policy documents, web pages, book reviews.
Peer reviewed articles	Non-peer reviewed articles
Published in English	Published in a language other than English.
Focuses primarily on the relationship between disordered eating and vegetarian/vegan diets	Does not focus primarily on the relationship between disordered eating and vegetarian/vegan diets.
Qualitative and quantitative research articles.	Secondary sources such as reviews, and commentary papers which do not present new research.
Articles published since January 2000	Articles published before January 2000.
Articles which focus on participants aged 11 or over.	Articles which focus on younger participants aged 0 to 10 years.

Table 3

PICOS Inclusion Criteria for Review

PICOS item	Inclusion/Exclusion Criteria
Population	Males or females aged 11 or over who: 1) have been identified (either through self-report or clinical diagnosis) as presenting with one of the following eating disorders (based on International Classification of Diseases, ICD-10, World Health Organisation, 1993, or Diagnostic and Statistical Manual of Mental Disorders, DSM-5, American Psychiatric Association, 2013): Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, Avoidant/Restrictive Food Intake Disorder, Other/Unspecified Eating Disorder. Participants identified with "Eating Disorder Not Otherwise Specified" or "EDNOS" (additional diagnoses used in DSM-4, American Psychiatric Association, 2000) or "Orthorexia Nervosa" (not yet recognised by the DSM-5, American Psychiatric Association, 2013) will also be included in this review. Participants also identify as following (or having followed) a vegan/vegetarian diet. OR: Participants have been recruited from a non-eating disorder population, but are identified as either vegetarian or vegan, and complete an eating disorder screening/inventory, such as the Eating Disorder

	Examination Questionnaire, EDE-Q (Fairburn & Beglin, 1994) or the Eating Attitudes Test, EAT-26 (Garner Olmsted, Bohr & Garfinkel, 1982) .
Exposure	Questionnaire/interview studies asking individuals to describe eating disorder pathology and current diet. Qualitative studies exploring individuals' experiences of disordered eating and vegetarianism/veganism.
Comparator	Any non-clinical population may be used as a comparator. Studies will compare groups primarily on basis of either vegetarian/vegan diet or participants with/without identified eating pathology.
Outcome	Difference in rates/presentation of eating pathology in individuals who identify as vegan/vegetarian and those who do not, OR differences in rates/presentation of vegetarianism/veganism in those with disordered eating and non-clinical controls. Narratives or themes about the relationship between disordered eating and vegan/vegetarianism in males and females aged 11 or over.
Study Design	Cross-sectional and longitudinal studies will be included. Questionnaire studies, case studies and qualitative studies which explore the relationship between eating pathology and vegetarianism/veganism will be included. Review articles, editorials and non-peer review studies will be excluded.

Search Strategy

Four key electronic databases (PsycINFO, PubMed, EMBASE, and Web of Knowledge) were searched on 13th January 2018. The search terms used to search full texts for this review were:

> "eating patholog*" OR "eating disorder*" OR "anorexi*" OR "bulimi*" OR "avoidant restrictive food intake disorder" OR "ARFID" OR "EDNOS" OR "orthorexi*" OR "binge"

The above search will be combined with (AND):

> "vegetarian*" OR "vegan*"

A scoping review of the four chosen databases helped to identify key search terms for this review. This also revealed that several key journals published relevant articles, including "Eating and Weight Disorders", "Appetite" "Eating Disorders" and "Eating Behaviors". Thus, these journals were also searched separately (on 13th January 2018) as part of this review. Given that these journals already focused on eating behaviours and pathology, full text articles were searched using the search terms: "vegetarian*" OR "vegan*".

Study Selection

From the initial database and journal search, 662 records were identified (the full search process is outlined in Figure 1). Following the removal of 147 duplicates, the titles and abstracts of the remaining 515 records were screened, and 452 records were excluded which did not meet inclusion criteria for this study. The full text of the remaining 62 articles were then assessed for eligibility,

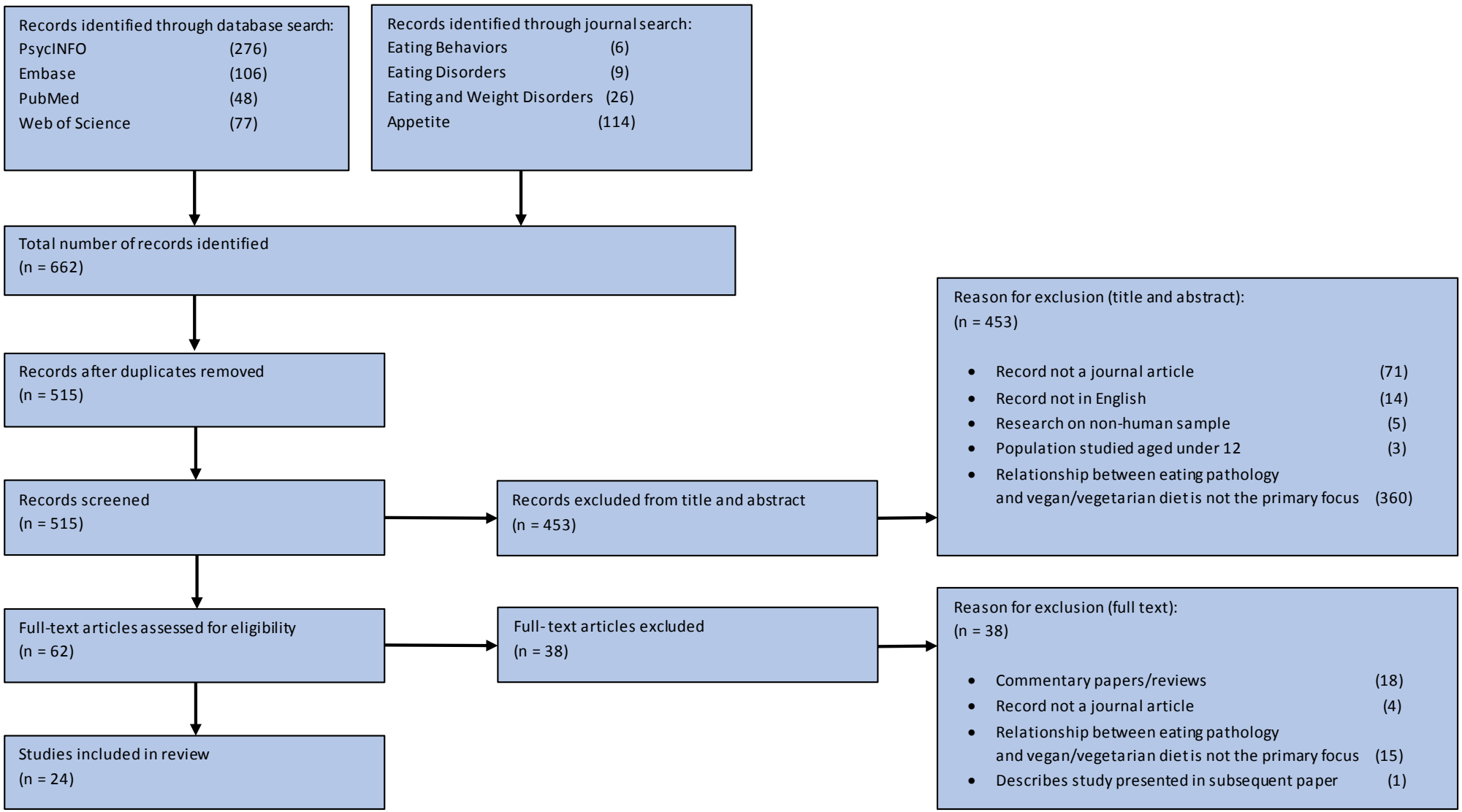

Figure 1. Flowchart of inclusion/exclusion process for literature search.

and a further 38 articles were excluded. Reasons for exclusion are outlined in Figure 1. Twenty-four articles met the inclusion criteria for this study and were subsequently included in this review. Reference lists of each of these articles were screened for any additional relevant literature, but no further articles meeting inclusion criteria were identified. A second rater reviewed six randomly selected studies at full-text screening stage to assess whether these studies met the PICOS criteria for inclusion in this study. 100% inter-rater reliability was achieved at this stage.

Data Extraction

Twenty-three of the articles identified for this study were assessed using the Quality Assessment Tool (QAT) for Quantitative Studies (Armijo-Olivo, Stiles, Hagen, Biondo & Cummings, 2012). This tool was developed by the Effective Public Health Practice Project to evaluate the quality of quantitative studies based on the following six criteria: A) selection bias, B) study design, C) confounders, D) blinding, E) data collection methods, and: F) withdrawals and dropouts (see Appendix B). A second rater independently reviewed the quality of three studies included in this study using the QAT tool. 100% inter rater reliability was achieved.

A data extraction sheet (see Appendix C) was then used to compile key information about each article (including study population, recruitment, measures used, findings and conclusions). One article identified for this review used qualitative methodology. The Critical Appraisal Skills Programme Qualitative Checklist (CASP, 2017) was thus used to assess the quality of this

study. This checklist uses 10 criteria for quality appraisal (see Appendix D). One point was awarded for each criterion met.

Results

Twenty-four articles met the criteria for inclusion in this review. Lindeman et al. (2000) and Timko et al. (2012) published findings of two studies each in their articles, which met eligibility criteria. Lindeman (2002) also published work comprising two studies, but only the first study met eligibility criteria for this review. Thus 24 articles comprising 26 eligible studies were examined in this work.

This review first compares the aims and study design for each study, before examining the sample and recruitment strategy used (see Table 4 for article number and summary of PICO criteria for each article). Given the predominance of studies using questionnaires in this review, the key measures used for each study are then described. Next, the main relevant findings of these articles, as well as the strengths and limitations of the work are considered. The implications of these findings, study limitations, and directions for future work are then discussed.

Study Aims

Most studies (n = 20) set out to investigate the relationship between vegetarianism and eating pathology in non-clinical samples (2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13a, 13b, 14, 15, 16, 18, 19, 21a, 21b, 22). Four of these studies (4, 5, 6, 16) aimed to investigate the prevalence and characteristics of ON in non-clinical samples using the ORTO-15 (Donini, Marsili, Graziani, Imbriale &

Table 4

Description of PICO for Included Articles (Articles Presented Alphabetically by Author)

Study No.	Author	Study Design	Target Population	Exposure	Comparator	Relevant Outcomes Measured
1	Bardone-Cone et al. (2012)	Cross-sectional, case-control	Female patients (n = 93) seen for ED (BN, AN or EDNOS) at US clinic (aged 16 or over). Sample comprised fully recovered (n = 19), partially recovered (n = 15) and non-recovered (n = 52) ED patients.	Questionnaire and structured interview	Female controls (n = 67) screened for current/past ED symptoms, recruited from US clinic/university campus. Comparison of individuals: 1) with and without ED history, and 2) at different stages of ED recovery.	Chi square analysis of: a) differences in past and current vegetarianism, b) motivations for vegetarianism across groups and c) ANCOVA to explore age at becoming vegetarian across groups (current age as covariate).
2	Barnett, Dripps & Blomquist (2016)	Cross-sectional	Men and women (aged 18 or over) recruited through alternative food network hubs (food co-ops, local/organic groceries) or environmental organisations (n = 284).	Online questionnaire	1) Comparison of subsamples identifying as "vegetarian" or "vegan/raw food" with those following other "special" diets. 2) Comparison of "special diet" and "no special diet" groups.	Analysis of difference in ED pathology between subgroups using Chi square and t-tests/ANOVAs.
3	Bas, Karabudak & Kiziltan (2005)	Cross-sectional	Turkish adolescents aged 17-21 (n = 1205)	Structured interview with questionnaire measures	Comparison of subsamples identifying as "vegetarian" and "non-vegetarian". Separate comparisons for males and females.	Analysis of prevalence of eating pathology across subgroups using Chi square, Mann Whitney U and Spearman's tests.
4	Dell'Osso et al. (2016)	Cross-sectional	Students and employees at Italian University aged 18-70 years (n = 2826)	Online questionnaire	Comparison of subsamples identifying as "vegetarian/vegan" and following a "standard diet".	Analysis of difference in ON symptoms between subsamples using Chi square and t-tests. Multiple logistic regression to identify predictors of ON.
5	Dell'Osso et al. (2017)	Cross-sectional	Students and employees at Italian University (n = 2130)	Online questionnaire	Comparison of subsamples identifying as "vegetarian/vegan" or following a "standard diet".	Analysis of difference in ON symptoms between subsamples using Chi squared and t-tests.
6	Dunn, Gibbs, Whitney & Starosta (2017)	Cross-sectional	Undergraduate students at US University (mean age 21.7, SD + 4.8) (n = 274)	Online or printed questionnaire	Comparison of subsamples identifying as vegetarian, vegan and following a diet with "no	Analysis of difference in ON symptoms between subsamples using ANOVA

					restriction"	and t-tests.
7	Estima, Philippi, Pimentel & Alvarenga (2012)	Cross-sectional	Adolescents aged 14-19 from 12 technical schools in Brazil (n = 1167)	Questionnaire	Comparison of subsamples identifying as vegetarian, and non-vegetarian.	Analysis of difference in ED risk behaviours between subsamples using t-tests and Chi squared.
8	Fisak, Peterson, Tantleff-Dunn, & Molnar (2006)	Cross-sectional	Female undergraduate students from US university (mean age 21.07, SD = 3.95) (n = 256)	Questionnaire	Comparison of subsamples identifying as vegetarian, and non-vegetarian.	Analysis of difference in ED pathology between subgroups using independent samples t-tests.
9	Forestell, Spaeth & Kane (2012)	Cross-sectional	Female college students attending psychology classes (n = 240)	Questionnaire and structured interview	Comparison of subsamples identifying as vegetarian, semi-vegetarian, flexitarian and non-vegetarian.	Analysis of: 1) difference in prevalence of ED pathology between subgroups using ANOVA and: 2) motivations for vegetarian diets.
10	Hannson, Bjorck, Birgegard & Clinton (2011)	Cross-sectional, case-control	Patients treated between August 2001-July 2002 at three specialist ED units in Sweden, attending 36-month follow-up (aged 15-50) (n = 70). Sample comprised recovered patients (n = 36), AN patients (n = 16) and BN patients (n = 18).	Questionnaire and structured interview	Female controls (aged 15-61), university students, high-school students and employees in Stockholm (n = 61). Comparison of: 1) ED patients and controls, 2) between ED subgroups	Analysis of difference in prevalence and likelihood of vegetarianism between subgroups using ANOVA and logistic regression.
11	Heiss, Coffino & Hormes (2017)	Cross-sectional, case-control	Adults, fluent in English (aged 18 or over) identifying as vegan (n = 358)	Questionnaire	Comparison with adults, fluent in English (aged 18 or over) identifying as omnivore (n = 220)	Analysis of differences in eating attitudes, behaviours and prevalence of disordered eating across groups using Chi squared and MANCOVA (gender as covariate).
12	Klopp, Heiss & Smith (2003)	Cross-sectional	Female US University sample (n = 143)	Questionnaire	Comparison of subsamples identifying as vegetarian versus non-vegetarian.	Analysis of difference in ED pathology between subgroups (using Kruskal-Wallis test). ANOVA and Chi square to compare individual EAT items and demographics.
13a	Lindeman, Stark & Latvala (2000)	Cross-sectional	Study A: female high school students, aged 16-18 recruited in Helsinki (n = 118)	Questionnaire	Comparison of subsamples identifying as vegetarian versus non-vegetarian.	Analysis of difference in ED pathology between subgroups using t-tests.

13b			Study B: female university students (aged 17-72) recruited in Helsinki (n = 124)	Questionnaire	Comparison of subsamples identifying as vegetarian versus non-vegetarian.	Analysis of difference in ED pathology between subgroups using t-tests.
14	Lindeman (2002)	Cross-sectional	Study A: Females (age 13-74) recruited during a university summer school (n = 308) (Study B not included)	Questionnaire	Comparison of subsamples identifying as vegetarian, semi-vegetarian and omnivores.	Analysis of difference in ED pathology between subgroups using ANOVA.
15	Michalak, Zhang & Jacobi (2012)	Cross-sectional, case-control	German adults (aged 18-65). Subsample representative of German non-institutionalised population who identify as vegetarian/semi vegetarian. (n = 242)	Questionnaire	Matched controls (aged 18-65). Subsample representative of German non-institutionalised population who identify as non-vegetarian. (n = 242)	Description of prevalence rates of EDs across groups.
16	Missbach, Hinterbuchinger, Dreiseitl, Zellhofer, Kurz & König (2015)	Scale construction, cross sectional study.	Adults without diagnosed diet-related diseases recruited (mean age 31.21 SD = 10.43) (n = 1029)	Questionnaire	Comparison of group identifying as vegetarian/vegan and those who identify as having a mixed diet.	Analysis of difference in ON symptoms between subsamples using Mann Whitney, Kruskall-Wallis and Spearman's tests.
17	Musolino, Warin, Wade & Gilchrist (2015)	Qualitative interview study.	Women (n=25) aged 16 or over identifying as having disordered eating, but have not been given diagnosis of ED.	Semi- structured and structured interviews	No comparison group.	Exploration of women's experiences of ED and vegetarianism/veganism as a practice of care using thematic analysis.
18	Perry, McGuire, Neumark-Sztainer & Story (2001)	Cross-sectional	Community sample of adolescents (aged 11-18) from 31 schools in Minnesota (n = 4746)	Questionnaire	Comparison of subsamples identifying as vegetarian and non-vegetarian.	Analysis of difference in likelihood of being given ED diagnosis by GP, body dissatisfaction and weight monitoring across subgroups using logistic regression.
19	Robinson-O'Brien, Perry, Wall, Story & Neumark-Sztainer (2009)	Cross-sectional	Follow-up study contacting previous sample of adolescents (aged 15-23) from 31 schools in Minnesota (n = 2516)	Questionnaire	Comparison of younger cohort (15-18 years) and older cohort (19-23 years) split into subgroups by diet: (former vegetarians, current vegetarians and never followed a vegetarian diet)	Analysis of difference in unhealthy weight behaviours, and binge eating across subgroups. Statistical tests not described.

20	Tannhauser, Latzer, Rozen, Tamir & Naveh (2001)	Cross-sectional, case-control	Female outpatients diagnosed with AN admitted to ED clinic between 1993-1995 in Israel, aged 13-21 (n = 45).	Questionnaire and interview	Controls recruited from large study of Israeli school girls (n = 156)	Analysis of: 1) rates of meat avoidance across samples using t-tests, and 2) reasons for, and timing of, meat avoidance in ED sample.
21a	Timko, Hormes & Chubski (2012)	Study A) Cross-sectional Study B) Cross-sectional, case-control	Study A: University and community female sample, aged 18 or over. Recruitment of undergraduates/ community sample (n = 486)	Online questionnaire	Study A: Comparison of subsamples identifying as vegetarian, semi-vegetarian, vegan and non-vegetarian.	Study A: 1) Analysis of difference in ED pathology between subgroups. 2) Descriptions of reasons for vegetarian diet using Kruskall-Wallis test. Study B: 1) Analysis of difference in ED pathology between groups using t-tests. 2) Descriptions of reasons for vegetarian diet.
21b			Study B: Female undergraduates from US university identifying as semi-vegetarian (n = 74)	Online Questionnaire	Study B: Undergraduates from US university identifying as semi-vegetarian (n = 44).	
22	Trautman, Rau, Wilson & Walters (2008)	Cross-sectional	First year college students in US (n = 330)	Questionnaire	Comparison of subsamples identifying as vegetarian and non-vegetarian.	Analysis of difference in ED pathology between groups using t-tests. 2) Descriptions of reasons for vegetarian diet.
23	Yackobovitch-Gavan et al. (2009)	Cross-sectional, case-control	Former female ED inpatients at first admission to ED clinic aged 18 or over. Comprised of patients with remitted (n = 36) and ED non-remitted (n = 24) status.	Interview and questionnaire ratings	Matched controls (n= 31). Females, aged 18 or over, with no mental health/ physical illness that could influence appetite/weight, weighing at least 85% ideal body weight with regular menstrual cycles.	Analysis of likelihood of past vegetarianism in remitting and non-remitting patients using logistic regression.
24	Zuromski et al. (2015)	Cross-sectional, case-control	Female ED patients in residential treatment (n = 69)		Female undergraduates identified with subclinical ED (n = 136) or non-clinical (n = 73)	Analysis of differences in: 1) current vegetarianism, 2) vegetarianism at some point over lifetime across subgroups. 3) Reasons given for vegetarianism using descriptive statistics.

Cannella, 2005), and, as part of this exploration, the researchers looked at the relationship between ON tendencies and vegetarianism. One study (2) aimed to examine the relationship between engagement with alternative food networks, disordered eating and special diets, and as a result, focused upon the link between following a special diet (such as vegetarian or vegan) and disordered eating.

There was only one mixed methods study (17) which used qualitative interviews rather than a questionnaire design. This study explored how "healthism" (Fullagar, 2002) - the pursuit of health as a personal responsibility and moral virtue - was embodied by women showing clinical symptoms of disordered eating. Vegetarianism was examined as a key part of participants' experiences.

The remaining studies (n = 5) examined vegetarianism in an ED setting (1, 10, 20, 23, 24), comparing prevalence of vegetarian diets amongst ED patients and healthy controls; three studies focused on the relationship between vegetarianism and ED pathology at different stages of recovery (1, 10, 23). One study focused instead, on the relationship between AN and meat avoidance (20), whilst the remaining study (24) examined the prevalence of vegetarianism in clinical, subclinical and non-clinical ED subsamples.

Study Design

Many studies used cross-sectional designs (n = 17), employing questionnaires and/or structured interviews to collect data at one time point (2, 3, 4, 5, 6, 7, 8, 9, 12, 13a, 13b, 14, 16, 18, 19, 21a, 22). These studies compared eating pathology across subgroups of their sample, with subgroup

divisions based on self-reported dietary grouping (such as “vegan” or “vegetarian” diet). Whilst eight of these studies compared eating pathology between participants following “vegetarian” and “non-vegetarian” diets (3, 7, 8, 12, 13a, 13b, 18, 22), four studies compared participants following “vegetarian or vegan” and “standard” or “mixed diets” (4, 5, 6, 16). In addition, four studies also included subcategories for further “special diet” groups, such as “semi-vegetarians”, “gluten free” and/or “flexitarians” (2, 9, 14, 21a). In addition, one study, categorized subgroups in terms of whether they identified as “former vegetarians”, “current vegetarians”, or “were never vegetarians” (19).

Only one study (17) used mixed methods. This study classified participants’ eating disorder status quantitatively using a structured diagnostic interview (see Table 5). Researchers then explored vegetarianism and eating behaviour qualitatively, carrying out semi-structured interviews with 25 women with eating pathology who had not sought treatment for ED. Data were analyzed using thematic analysis with elements of grounded theory.

Whilst most quantitative studies (n = 17) collected data from convenience samples without recruiting a control group, the remaining eight studies used a case-control design (1, 10, 11, 15, 20, 21b, 23, 24). Of these studies, five focused on comparisons between patients with ED and controls. One study (24) compared vegetarianism in female ED patients in residential treatment (n = 69), with female undergraduates identified as having subclinical ED (n = 136) or no ED (n = 73). Another study (20) compared vegetarianism in AN patients versus healthy controls. Moreover, three case-controlled studies focused on comparisons between participants at various stages of ED recovery and controls (1, 10, 23). One study (1) compared vegetarianism in fully (n = 19),

partially (n = 15), or non-recovered ED patients (n = 52) with female healthy controls (n = 67). Similarly, a second study (10) compared vegetarianism in patients at various stages of recovery (36 recovered patients, 16 AN patients and 18 BN patients) with female controls (n = 61). A final study (23) compared former ED inpatients (36 remitted and 24 non-remitted) with female matched controls (n = 31).

The remaining three case-control studies compared participants based on their dietary classifications rather than ED diagnosis (11, 15, 21b), comparing eating pathology in: 1) 358 vegan versus 220 omnivore participants (11), 2) 54 vegetarian/ 190 predominantly vegetarian versus 3872 non-vegetarians and a subsample of 242 matched controls (15), and: 3) 74 participants who identified as semi-vegetarians versus 44 omnivores (21b).

Sample and Recruitment

Studies included 24,120 participants in total, the majority of whom were female. Thirteen studies recruited females only (1, 8, 9, 12, 13a, 13b, 14, 17, 20, 21a, 21b, 23, 24) and approximately 66% of the total sample across studies comprised female participants. The age of the sample ranged from 11-72 years. Whilst most studies recruited participants who were at least aged 16 or over, six studies recruited younger participants (7, 10, 14, 18, 19, 20). One study (22) did not report the age range of their sample.

Participants were recruited from ED clinics for five of the studies (1, 10, 20, 23, 24), ten studies recruited participants from university samples (3, 4, 5, 6, 8, 12, 13b, 14, 21a, 21b). Six studies recruited participants from college or school (7, 9, 13a, 18, 19, 22), whereas three studies recruited from the

community (2, 11, 17). One study (16) did not provide details of their recruitment procedure, whilst another study (15) recruited participants as part of a German nationwide epidemiological study.

Key ED/ diet measures used

Many different ED measures were employed in these studies (see Table 5). These included the Eating Disorder Examination Questionnaire (EDE-Q, Fairburn & Beglin, 1994), ORTO-15 (Donini et al., 2005), the Eating Disorder Diagnostic Scale (EDDS, Stice, Telch & Rizvi, 2000), EAT-40 (Garner & Garfinkel 1979), EAT-26 (Garner, Olmsted, Bohr & Garfinkel, 1982), The Eating Disorder Inventory 2 (EDI-II, Garner, Schafer & Rosen, 1991), the Dutch Eating Behavior Questionnaire (DEBQ, Van Strein, Frijters, Bergers & Defares, 1986), Binge Eating Scale, (BES, Gormally Black, Daston & Rardin, 1982) and the Eating Disorders Longitudinal Interval Follow-up Evaluation (LIFE EAT II, Herzog et al., 1993). Structured interviews were also used in several studies to measure ED pathology, including the Structured Clinical Interview for the DSM-IV, (SCID, First, Spitzer, Gibbon & Williams, 1995), the Eating Disorder Examination, (EDE, Fairburn, Cooper & O'Connor, 2008) and the Munich Composite International Diagnostic Interview (M-CIDI, World Health Organisation, 1997).

Whilst eleven studies used multiple measures of eating pathology (1, 2, 8, 9, 11, 13a, 13b, 21a, 21b, 22, 23), eleven studies relied on one validated measure (3, 4, 5, 6, 10, 12, 14, 15, 16, 17, 24). However, three studies used questionnaire items which were not part of a validated ED questionnaire, instead creating their own items/scales (7, 18,19). One study (20) identified ED

Table 5

Summary of Measures Used for Each Included Article

Author	Key Diet and ED Measures
1. Bardone-Cone et al. (2012)	**Diet:** 1) "Have you ever considered yourself a type of vegetarian (e.g., not eating beef but eating other meat; not eating any meat at all)?". (Participants eating fish/chicken but no red meat were grouped together with strict vegetarians). 2) Age of transition to vegetarianism. 3) Primary reason for cutting out meat from diet ("health reasons", "ethical reasons", "weight-related reasons" or "other (please specify)". 4) "Are you currently vegetarian?". 5) "In your opinion, what relationship did vegetarianism have to your eating disorder?" **ED:** 1) SCID[1], 2) EDE-Q[2], 3) LIFE EAT II[3].
2. Barnett, Dripps & Blomquist (2016)	**Diet:** 1) "Do you follow any of the following diets: vegetarian, pescatarian, vegan, raw foods, paleo, gluten free or none of the above?" (Diets not explicitly defined for participants). **ED:** 1) EDE-Q, 2) ORTO-15[4], 3) EDDS[5], 4) "Do you currently or have you ever suffered from an eating disorder?".
3. Bas, Karabudak & Kiziltan (2005)	**Diet:** 1) "Are you vegetarian?", 2) "How long have you been vegetarian?", 3) "What are your reasons for becoming vegetarian?". **ED:** EAT-26[6].
4. Dell'Osso et al. (2016)	**Diet:** Demographics including "type of diet- standard or vegetarian/vegan?"). **ED:** ORTO-15.
5. Dell'Osso et al. (2017)	**Diet:** Demographics including "type of diet- standard or vegetarian/vegan?"). **ED:** ORTO-15.
6. Dunn, Gibbs, Whitney & Starosta (2017)	**Diet:** Questionnaire describing diet and exercise; food preparation habits; and attitudes regarding healthy eating. These items were not described in detail. **ED:** ORTO-15.

7. Estima, Philippi, Pimentel & Alvarenga (2012)	**Diet:** 1) “Are you vegetarian now?”, 2) “How long have you been a vegetarian?”, 3) “Reasons for following a vegetarian diet?”. **ED:** No validated measure used. Recorded frequency of: 1) “Binge eating episodes”, 2) “Compensatory mechanisms (e.g. purging, diuretics, self-induced vomiting, to control weight)”, 3) “Following a strict diet/fasting within the last 3 months”.
8. Fisak, Peterson, Tantleff-Dunn, & Molnar (2006)	**Diet:** 1) "Are you a vegetarian?" Vegetarian subgroups based on foods that they abstain from eating (no description of how categorisation was achieved). **ED:** 1) EDI-2[7], 2) DEBQ[8], 3) EAT-26, 4) TFEQ[9], 5) FCQ[10].
9. Forestell, Spaeth & Kane (2012)	**Diet:** 1) “Choose a category which best characterises your eating behaviour: vegan, lacto-vegetarian, ovo-vegetarian, pesco-vegetarian, semi-vegetarian, flexitarian or omnivore.” Each category was defined. 2) FFQ[11] **ED:** 1) TFEQ, 2) EAT-26, 3) FCQ.
10. Hannson, Bjorck, Birgegard & Clinton (2011)	**Diet:** Demographics collected including diet (“mixed or vegetarian”). **ED:** 1) Diagnosis from patient files, 2) EDI-II.
11. Heiss, Coffino & Hormes (2017)	**Diet:** “Do you adhere to any vegetarian diets?” (Definitions of each category provided). **ED:** 1) EDE-Q, 2) DEBQ, 3) EDI- drive for thinness subscale[12], 4) BES[13], 5) YFAS[14].
12. Klopp, Heiss & Smith (2003)	**Diet:** 1) “Are you vegetarian?”, 2) Which type: “semi vegetarian (consumes some chicken and fish), ovo-vegetarian (consumes eggs), lacto-ovo-vegetarian (consumes dairy and eggs), or vegan (consumes no animal origin foods)?”. **ED:** EAT-40[15].
13. Lindeman, Stark & Latvala (2000)	**Study A:** **Diet:** Question about vegetarian (“no red and white meat and fish”) not described in detail. **ED:** 1) EAT-26, 2) FCQ.

	Study B: **Diet:** Question about vegetarian not described in detail. **ED:** 1) EAT-26, 2) EDI.
14.Lindeman (2002)	**Diet:** Demographics collected including diet ("vegetarian, semi vegetarian (avoided red meat or only ate fish) or omnivore"). **ED:** 1) EAT-26.
15.Michalak, Zhang & Jacobi (2012)	**Diet:** 1) "Do you follow a vegetarian diet (no meat) or did you follow a vegetarian diet in the past?". 2) A food frequency questionnaire of 35 foods. **ED:** M-CIDI[16].
16.Missbach, Hinterbuchinger, Dreiseitl, Zellhofer, Kurz & König (2015)	**Diet:** Participants asked about food intolerances, dieting frequency, dieting styles (vegan, vegetarian, mixed diet), prevalence of eating disorders and mental disorders and lifetime weight fluctuation. **ED:** ORTO-15.
17.Musolino Warin, Wade & Gilchrist (2015)	**Diet:** Experiences of vegetarianism explored in qualitative interviews. **ED:** EDE[17].
18.Perry, McGuire, Neumark-Sztainer & Story (2001)	**Diet:** 1) "Are you a vegetarian?", 2) "As a vegetarian, do you eat any of the following? eggs; dairy food (such as milk, cheese); chicken; fish.", 3) "What are your main reason(s) for eating a vegetarian diet?". 4) "How long have you been vegetarian?". **ED:** Non-validated measures used such as: 1) "Do you engage in weight control methods including exercise, fasting, taking diet pills, skipping meals, etc.?", 2) "Do you engage in healthy weight control behaviours (exercise, eating more fruits and vegetables, eating less high fat foods)?", 3) "Do you engage in unhealthy weight control behaviours including fasting, eating little, using food substitutes, skipping meals, and smoking cigarettes?". 4) "Have you vomited or taken diet pills or laxatives during the previous week for weight control purposes?".

19. Robinson-O'Brien, Perry, Wall, Story & Neumark-Sztainer (2009)	**Diet:** 1) "Are you a vegetarian now?", 2) "How long have you been vegetarian?", 3) "Do you consume eggs, chicken, or fish?", 4) "Have you ever been vegetarian?". **ED:** Non-validated questionnaires used: 1) "In the past year have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge eating)?", 2) "During the times when you ate this way, did you feel you could not stop eating or control what or how much you were eating?".
20. Tannhauser, Latzer, Rozen, Tamir & Naveh (2001)	**Diet:** Self-reported meat consumption measured. AN population participated in routine nutritional assessment at admission**.** Food frequency questionnaire administered to controls to measure frequency of eating twelve meat items. **ED:** Eligible as target group if attending ED clinic for treatment.
21. Timko, Hormes & Chubski (2012)	**Study A:** **Diet:** Demographics including: 1) adherence to vegetarian diet, 2) type of diet, 3) reasons for diet and length of time diet has been followed. 4) Food frequency questionnaire designed for this study. **ED:** 1) DEBQ, 2) EAT-26), 3) FAAQ[18]. **Study B:** **Diet:** Individuals who self-reported avoiding some meat compared with omnivores. Specific questions asked are unclear. **ED:** Restraint Scale[19], 2) EDE-Q.
22. Trautman, Rau, Wilson & Walters (2008)	**Diet:** Demographics including adherence to vegetarian diet and reasons for adopting vegetarian lifestyle. **ED:** 1) DEBQ), 2) EAT-26.
23. Yackobovitch-Gavan et al. (2009)	**Diet:** Items from Eating Disorders Family History Interview, EDFHI (Strober, 1987) to measure vegetarianism. **ED:** 1) SCID, 2) YBC-ED[20], 3) EDFHI[21], 4) EDI-2, 5) CO-Ano[22].

24.Zuromski et al. (2015)	**Diet:** Participants asked about current/lifetime vegetarianism, reasons for choosing/ stopping vegetarianism, regular consumption of different food items (such as eggs, chicken, fish and beef). **ED:** 1) EDE-Q, 2) non-validated items to assess lifetime disordered eating.

[1]The Structured Clinical Interview for DSM IV, SCID (First, Spitzer, Gibbon & Williams 1995); [2]Eating Disorder Examination Questionnaire EDE-Q (Fairburn & Beglin, 1994); [3]LIFE EAT II (Herzog, Sacks, Keller, Lavori, Von Ranson & Gray, 1993); [4]ORTO-15 (Donini et al., 2005); [5]Eating Disorder Diagnostic Scale. EDDS (Stice, Telch, & Rizvi, 2000); [6]The Eating Attitudes Test, EAT-26 (Garner Olmsted, Bohr & Garfinkel, 1982); [7]Eating Disorder Inventory 2, EDI-2 (Garner et al., 1991); [8]The Dutch Eating Behavior Questionnaire, DEBQ (Van Strien Frijters, Bergers & Defares, 1986); [9]Three Factor Eating Questionnaire, TFEQ (Stunkard & Messick, 1985); [10] Food Choice Questionnaire, FCQ (Steptoe, Pollard & Wardle, 1995); [11]Food Frequency Questionnaire (FFC, Mullen, Krantzer, Grivetti, Schultz & Meiselman, 1984); [12]Eating Disorder Inventory, EDI (Garner, Olmstead & Polivy, 1983); [13]Binge Eating Scale, BES (Gormally, Black, Daston & Rardin, 1982); [14]Yale Food Addiction Scale, YFAS (Gearhardt, Corbin & Brownell, 2009); [15] The Eating Attitudes Test, EAT- 40 (Garner & Garfinkel, 1979)**;** [16]Munich-Composite International Diagnostic Interview, M-CIDI (World Health Organisation, 1997); [17]Eating Disorder Examination (Fairburn et al., 2008); [18]Food Acceptance and Action Questionnaire, FAAQ (Juarascio, Forman, Timko, Butryn & Goodwin, 2011); [19]The Restraint Scale (Herman & Polivy, 1980); [20]Yale-Brown-Cornell Obsessive Compulsive-Eating Disorders Scale, YBC-ED (Sunday, Halmi & Einhorn, 1995); [21]Eating Disorders Family History Interview, EDFHI (Strober, 1987); [22]Cognitive Orientation Questionnaire for Anorexia Nervosa, CO-Ano (Kreitler, Bachar, Canetti, Bonne & Berry, 2003).

on the basis of diagnosis at an ED clinic alone, rather than self-report measures.

Due to the lack of validated measures of vegetarianism/veganism, all but two studies (17, 23) created their own measure/classification system. Four studies included vegetarianism and veganism separately in their classifications (2, 9, 12, 16) whilst two studies combined vegan and vegetarianism in one category (4, 5). Five studies did not describe how they measured vegetarianism in any detail (4, 6, 13a, 13b, 14) and five studies employed only one question to classify vegetarian and non-vegetarian diets (2, 5, 10, 12, 16). Whilst most studies did not give a definition for vegetarianism to their participants, six studies were more thorough, including descriptions of their diet categories within their questionnaire, to clarify their classifications with participants (8, 9, 11, 12, 22, 24).

Some of the studies also included additional follow-up questions about vegetarian diets, such as: 1) length of time since becoming vegetarian (1, 3, 7, 9, 18, 19, 20, 21a), 2) reasons for adhering to a vegetarian diet (1, 3, 7, 11,18, 19, 20, 21a, 21b, 22, 24), and: 3) past vegetarianism (15, 19, 24). Moreover, seven studies employed food checklists as part of their questionnaire/ interview, to ascertain which foods participants did/did not eat (9, 15, 18, 19, 20, 21a, 24). These items thus helped to inform whether participants were classified as vegetarian/another diet subtype.

One study used semi-structured interviews to explore the relationship between disordered eating and vegetarianism (17). Unfortunately, no interview schedule or example questions were provided. Furthermore, only one study used a pre-existing questionnaire to explore vegetarian diet (23) which utilized

questions from the Eating Disorders Family History Interview (Strober, 1987) to examine ED-related vegetarianism. Again, the items used were not described in detail.

Main Findings: Is there a Relationship between Eating Pathology and Vegetarianism?

The main findings, study limitations, and quality appraisal ratings for each study are summarised in Table 6.

Vegetarianism in clinical ED population. Five studies (1, 10, 20, 23, 24) examined the relationship between the prevalence of vegetarianism and eating pathology in a clinical population. One study (10) found that a significantly higher proportion of participants diagnosed with AN reported adhering to a vegetarian diet compared with controls. Similarly, another study (20) found higher prevalence of vegetarianism in AN patients than controls. At hospital admission, 95.6% of their AN sample avoided red meat and 75.6% reported avoiding all meat. In contrast, only 7.1% of controls were vegetarian, with 4.5% reporting that they restricted meat intake.

In addition, one study (24) compared prevalence of vegetarianism in an ED clinical, subclinical and non-clinical sample. They found that while only 6.8% of the non-clinical sample reported past/current vegetarianism, 17.6% of subclinical sample and 34.8% of clinical sample identified as past/current vegetarian. Whilst there were no significant differences in rates of current vegetarianism between the nonclinical and subclinical groups, the clinical ED participants were significantly more likely to identify as current vegetarians than the other two groups. Similarly, another study (1) found that a significantly higher proportion of participants with ED reported past/current vegetarianism

compared with non-ED group, and a higher percentage of the non-recovered ED group were vegetarian than for recovered/partially recovered ED groups.

Whilst few studies explored the relationship between vegetarian diets and remission from ED, one study (23) found that significantly more non-remitted patients were identified as vegetarians compared with remitted ED patients. This research suggested that vegetarianism may be an important factor in recovery from AN, but more research is needed to explore this relationship further.

Two studies explored the temporal order of vegetarianism and onset of ED (1, 20). In one study (1) 59.6% of participants reported that the age of becoming vegetarian was one year after their first ED symptoms. However, another study (20) reported a contradictory timeline, with over half of their AN sample reporting that meat avoidance pre-dated the onset of their ED by several years. Thus, it is still unclear whether vegetarianism or ED onset are more likely to occur first, or if indeed, there is a temporal relationship between the two.

Vegetarianism in non-clinical sample. Seven studies (3, 12, 13a, 13b, 18, 19, 22) found a significant relationship between vegetarianism and eating pathology in non-clinical samples of adolescents/adults. One of these studies (18) found that in a community adolescent sample, vegetarians reported being significantly more likely to have been told by their GP that they had an eating disorder, and were significantly more likely to be dissatisfied with their bodies than non-vegetarians. In addition, significantly higher scores on eating pathology measures (3, 19) were found for vegetarian compared with non-

vegetarian adolescents. Similar findings were reported for a sample of first year college students (22) and a female university sample (12).

Several studies examined differences in prevalence of participants reaching clinical cut-offs for ED diagnosis within their non-clinical samples. One study (13a) found 20% of vegetarian female high-school students scored higher than the clinical cut-off for disordered eating, compared with 3.9% of non-vegetarians. In their second study (13b) these researchers found that 14.3% of vegetarian female university students scored higher than the clinical cut-off for disordered eating, compared with 8.3% of non-vegetarians. Moreover, whilst one German nationwide epidemiological study (15) reported that prevalence of ED was too low in their sample to employ inferential statistics, descriptively they found elevated 1-month, 12-month and lifetime prevalence rates of ED in the vegetarian participants compared with non-vegetarians.

Four studies examined the relationship between vegetarian/vegan diets and ON tendencies using the ORTO-15 measure (4, 5, 6, 16). Three of these studies found higher levels of ON symptoms in the vegetarian/vegan group compared with the “standard” diet (4, 5, 16). In contrast, one study (6) compared ON symptoms in vegetarian, vegan and non-vegetarian undergraduates and found no significant differences across these three diet groups. However, vegans reported significantly lower ON symptoms than “no dietary restrictions” group. Thus, whilst there is some tentative evidence to suggest that there may be a significant relationship between ON and vegetarian/vegan diets, there are some limitations to the ON measures used (see the “limitations” section).

Furthermore, two studies found no significant differences on eating pathology measures between vegetarians and non-vegetarians, in an adolescent sample (7) and a female undergraduate sample (8). Thus, findings for a relationship between disordered eating and vegetarianism in a non-clinical sample were mixed, but there was some preliminary evidence for higher prevalence of eating pathology amongst vegetarians compared with non-vegetarians. Although promising, more research is needed to explore this relationship further.

Veganism, semi-vegetarianism and other special diet groups. Although most studies explored differences between vegetarian and non-vegetarian participants, six studies explored other special diet groups independently (2, 9, 11, 14, 21a, 21b). Four studies suggested that semi-vegetarians were at higher risk for eating pathology than other subgroups, such as omnivores and strict vegetarians (9, 14, 21a, 21b). In addition, one study (11) compared eating pathology in vegans and omnivores. Whilst there were no significant differences across groups for several ED measures, vegans were significantly lower on eating restraint scores, eating concern, shape concern and EDE-Q global scale.

Another study (2) compared eating pathology across several different "special diet" groups, including, vegan/raw, vegetarian and gluten-free. They found no significant differences on ED measures across different special diet groups, although the "special diet" group reported significantly more current/past EDs and ON tendencies. Unfortunately, it is difficult to determine which special diets are associated with increased prevalence of current/past

EDs from these findings. Thus, more research comparing eating pathology across these dietary subgroups is needed.

Reasons for vegetarianism. Nine studies (1, 3, 7, 18, 19, 21a, 21b, 22, 24) also examined the primary reason reported for adherence to a vegetarian diet. Amongst ED patients, one study (1) found that the main reason given for adhering to a vegetarian diet was weight-related. Results in non-clinical samples were mixed. One study reported ethical, taste and health as the three most commonly reported reasons for adhering to a vegetarian diet (24). Other studies reported dislike of taste (3, 22, 21b) ethical reasons (21a), or weight control (18, 19) as the main reason reported by vegetarians for their dietary choice in their samples. Thus, it appears that for some, but not all vegetarians, adhering to a vegetarian diet may be used as a method of weight control.

One mixed methods (17) study focused in part, on reasons for vegetarian diets in women with eating pathology. Nine participants said that they were vegetarian or vegan and six more said that they ate limited meat/identified as vegetarian at some stage in their lives. Participants described following healthy lifestyles “in spite of” their eating disorders and embodying certain eating regimes to create perceptions of health (p. 21). Moreover, one participant reported telling her family that she was vegetarian and lactose intolerant, to avoid having to defend her “fussy eating”. Thus, vegetarianism was described as a way to legitimise food avoidance.

Table 6

Summary of Location, Main Relevant Findings, Study Limitations and Study Quality Ratings

Author	Country	Main findings	Risk of bias/limitations	QAT/CASP score
1. Bardone-Cone et al. (2012)	United States	1) Significantly greater % of ED group reported current/past vegetarianism compared with non-ED group. Primary reason for vegetarianism in ED group was weight-related. 2) No significant difference between fully, partially and non-recovered groups on any variables, except significantly greater % of non-recovered group were vegetarian. 3) 68.1% of those with ED history and experiences of vegetarianism reported a relationship between the two, with 59.6% reporting age of vegetarianism as 1 year after first ED symptoms.	No consideration of diagnostic differences between AN, BN and EDNOS in sample.	A- Moderate B- Moderate C- Moderate D- Moderate E- Moderate F- Strong **Global – Moderate**
2. Barnett, Dripps & Blomquist (2016)	United States	No significant differences between "special diet" and "no special diet" group on validated ED measures, but "special diet" group self-reported significantly more current and past EDs and ON tendencies than "no special diet" group. No significant differences on ED measures across different special diet groups.	No control group. Only 11.6% of sample were vegan/vegetarian. Many analyses do not look at vegetarianism/veganism independently, but as part of "special diet" group. Predominantly female sample, no information on ethnicity reported.	A- Weak B- Weak C- Strong D- Moderate E- Weak F- Strong **Global- Weak**
3. Bas, Karabudak & Kiziltan (2005)	Turkey	Male vegetarians scored significantly higher on EAT-26, dieting and oral control measures than non-vegetarian males. Female vegetarians scored significantly higher on EAT-26, dieting and oral control measures than non-vegetarian females	No control group. Only 2.6% of sample were vegetarian. Demographics and reason for gender split unclear.	A- Moderate B- Weak C- Weak D- Weak E- Moderate F- Strong **Global- Weak**
4. Dell'Osso et al. (2016)	Italy	Vegetarian/vegan subjects had significantly more ON symptoms, lower BMI and were more frequently underweight than non-vegetarians/vegans.	No control group. University sample. Only 6.9% of sample were vegetarian and 1.7% vegan. Multiple comparisons made on many variables. Vegetarians/vegans grouped together.	A- Weak B- Weak C- Moderate D- Moderate E- Weak F- Weak **Global- Weak**

5. Dell'Osso et al. (2017)	Italy	Vegetarian/vegan subjects had significantly higher levels of ON symptoms than subjects on standard diets.	No control group. University sample. Only 11.3% of sample were vegan/vegetarian. Multiple comparisons made on many variables. Vegetarians/vegans grouped together.	A- Weak B- Weak C- Weak D- Weak E- Moderate F- Weak **Global- Weak**
6. Dunn, Gibbs, Whitney & Starosta (2017)	United States	Subgroups based on diet did not differ significantly on measures. Vegans had significantly lower ON symptoms than "no dietary restrictions" group.	No control group. University sample. No demographics described. Only 10% of sample were vegetarian and 2% vegan.	A- Weak B- Weak C- Weak D- Moderate E- Weak F- Strong **Global- Weak**
7. Estima, Philippi, Pimentel & Alvarenga (2012)	Brazil	No significant differences in ED behaviours between vegetarian and non-vegetarian groups.	No control group. Few demographics reported. Only 4.1% of sample were vegetarian.	A- Moderate B- Weak C- Weak D- Moderate E- Weak F- Strong **Global- Weak**
8. Fisak, Peterson, Tantleff-Dunn, & Molnar (2006)	United States	No significant differences on ED measures between vegetarian and non-vegetarian groups.	No control group. Female undergraduate sample. 20.3% of sample were vegetarian.	A- Weak B- Weak C- Weak D- Moderate E- Moderate F- Strong **Global- Weak**
9. Forestell, Spaeth & Kane (2012)	United States	No significant differences on eating pathology measures across diet groups. Semi-vegetarians and flexitarians reported significantly more concern about weight control and less concern about animal welfare than other diet groups. Semi-vegetarians and pesco-vegetarians did not differ from omnivores in their concern about weight control.	No control group Female undergraduate sample. 22.9% vegetarian, 11.6 % pesco-vegetarian, 12.1% semi-vegetarian, 15.4% flexitarian and 37.9% omnivore.	A- Weak B- Weak C- Strong D- Moderate E- Strong F- Strong **Global- Weak**

10. Hannson, Bjorck, Birgegard & Clinton (2011)	Sweden	56% of AN group were vegetarian compared with 8% of controls. The odds of eating vegetarian food were considerably higher for AN group compared with recovered group and controls. Recovered ED subjects who were vegetarian were more likely to diet and restrict food than recovered ED subjects who ate a mixed diet.	Controls were significantly younger than AN group. Small subgroups- EDNOS grouped with BN and AN subjects.	A- Moderate B- Moderate C- Moderate D- Moderate E- Moderate F- Weak **Global- Moderate**
11. Heiss, Coffino & Hormes (2017)	United States	Vegans were significantly lower on restraint, eating concern, shape concern and EDE-Q global scale. No significant differences across groups for any other eating pathology/behaviour measure.	61.9% vegan, 38.1% omnivore. Need for a more diverse sample- majority of vegans identified as ethical vegans rather than vegan for health reasons, which may influence results.	A- Moderate B- Moderate C- Strong D- Moderate E- Strong F- Weak **Global- Moderate**
12. Klopp, Heiss & Smith (2003)	United States	Median scores on ED pathology measures were significantly higher for vegetarians than non-vegetarians.	No control group. Female college students. "Vegetarians" were identified as those eating some meat in this sample. 21.0% of sample identified as vegetarian.	A- Moderate B- Weak C- Strong D- Moderate E- Weak F- Strong **Global- Weak**
13. Lindeman, Stark & Latvala (2000)	Finland	Study A: vegetarians score higher on eating pathology measures than non-vegetarians. 20% of vegetarians scored higher than the clinical cut-off for disordered eating, compared with 3.9% of non-vegetarians. Study B: vegetarians score higher on eating pathology measures than non-vegetarians. 14.3% of vegetarians scored higher than the clinical cut-off for disordered eating, compared with 8.3% of non-vegetarians.	No control group. Female high school/university students. No description of demographics across groups. Only 12.7% of sample were vegetarian (study A), 11.3% of sample were vegetarian (study B).	Study A and B: A- Weak B- Weak C- Weak D- Moderate E- Moderate F- Weak **Global- Weak**
14. Lindeman (2002)	Finland	Semi-vegetarians and vegetarians scored significantly higher on the ED measures than omnivores.	No control group. Finnish females, low ethnic diversity. 13.6% vegetarian, 22.4% semi-vegetarian, 64.0% omnivore.	A- Moderate B- Weak C- Weak D- Moderate E- Strong F- Strong **Global- Weak**
15. Michalak, Zhang & Jacobi (2012)	Germany	Descriptively, there were strongly elevated 1 month, 12 month and lifetime prevalence rates of ED in the vegetarian group compared with non-vegetarians.	ED too rare in the sample so only descriptive statistics could be reported.	A- Strong B- Moderate C- Strong

					D- Moderate E- Moderate F- Moderate **Global- Moderate**
16.	Missbach, Hinterbuchinger, Dreiseitl, Zellhofer, Kurz & König (2015)	Austria	Subjects following a vegetarian or vegan diet showed significantly higher ON tendencies than subjects on a mixed diet.	No control group. Proportion of vegetarians and vegans in the sample not reported.	A- Weak B- Weak C- Weak D- Moderate E- Moderate F- Moderate **Global- Weak**
17.	Musolino, Warin, Wade & Gilchrist (2015)	Australia	Women described being healthy "in spite of" eating disorder, and embodying certain food and eating regimes to create perceptions of health. Nine participants were vegetarian or vegan and six more identified as vegetarian at some stage/limited meat intake. Participants allowed their vegetarianism to legitimise food avoidance. One participant described telling her family she is vegetarian and lactose intolerant to avoid having to defend her "fussy eating".	Sample of 25 women with mixed ED/diet histories Lack of reflexivity/description of how the researcher influenced the research. No description of contradictory information or alternative positions/stories.	**CASP score 8/10**
18.	Perry, McGuire, Neumark-Sztainer & Story (2001)	United States	Vegetarians reported being significantly more likely to be told by their GP that they have an eating disorder, and more likely to be dissatisfied with their bodies and weight themselves than non-vegetarians.	No control group. Sample of adolescents at school. Only 5.8% of sample were vegetarian. Some analyses group vegetarians and semi-vegetarians together.	A- Moderate B- Weak C- Moderate D- Moderate E- Weak F- Weak **Global- Weak**
19.	Robinson-O'Brien, Perry, Wall, Story & Neumark-Sztainer (2009)	United States	Significantly higher % of current vegetarians in both the older and younger cohorts reported binge eating with loss of control compared with those who were never vegetarian. 20% of current vegetarians reported their diet was used to control their weight.	No control group. 4.3% of sample were vegetarians, 10.8% were former vegetarians. 46% of vegetarians reported that they ate fish.	A- Moderate B- Weak C- Strong D- Moderate E- Weak F- Weak **Global- Weak**
20.	Tannhauser, Latzer, Rozen, Tamir & Naveh (2001)	Israel	At admission 95.6% of AN group avoided red meat and 75.6% reported avoiding all meat (though half reported occasionally having to eat meat due to family pressures). Only 7.1% of controls were vegetarian, with 4.5% reporting	AN outpatients from one ED clinic.	A- Moderate B- Moderate C- Strong D- Moderate

		that they restricted meat intake. Meat avoidance was 6.5 times more prevalent in inpatients than controls. For over half of AN patients meat avoidance pre-dated onset of ED by several years.		E- Weak F- Weak **Global- Weak**
21. Timko, Hormes & Chubski (2012)	United States	Study A: No significant differences in eating pathology scores (on EAT-26) across different diet groups. Nevertheless, semi-vegetarians presented with most disordered eating (significantly higher eating restraint, external eating, hedonic hunger and avoidance of food cues). Study B: 47.7% reported sensory reasons/taste as the main reason for avoiding meat. No significant differences on ED measures between vegetarians and non-vegetarians apart from semi-vegetarians scored significantly higher on eating restraint and EDE-Q eating concern scale than omnivores.	Study A: no control group. Study B: case-control (omnivores and semi-vegetarians) but sampled female undergraduate only.	Study A and B: A- Weak B- Moderate C- Weak D- Moderate E- Strong F- Moderate **Global- Weak**
22. Trautman, Rau, Wilson & Walters (2008)	United States	The most frequently reported reason for vegetarianism was dislike of taste (76.7%), health reasons (53.3%) and weight control (46.7%). Vegetarians scored significantly higher on dietary restraint and eating pathology measures than non-vegetarians. Of the participants whose eating pathology scores reached clinical cut-offs, 16.7% were vegetarian, whilst only 9.7% were non-vegetarian.	No control group. University sample. Only 10.6% of invited undergraduates agreed to take part. Groups semi-vegetarians and vegetarians together.	A- Weak B- Weak C- Weak D- Moderate E- Moderate F- Weak **Global- Weak**
23. Yackobovitch-Gavan et al. (2009)	Israel	Past ED related vegetarianism predicted non- remission in a sample of female AN patients. At follow-up significantly more non-remitted patients were identified vegetarians than remitted patients.	Only 39.5% of ED patients considered eligible agreed to participate.	A- Weak B- Moderate C- Strong D- Moderate E- Strong F- Weak **Global- Weak**
24. Zuromski et al. (2015)	United States	6.8% of non-clinical sample, 17.6% of subclinical sample and 34.8% of clinical sample identify as having been vegetarian at some point in their lifetime. No significant differences in rates of current vegetarianism between nonclinical and subclinical groups, but the clinical group were significantly more likely to identify as current vegetarians.	Demographics of samples not clearly described. Control group comprised of female undergraduates.	A- Moderate B- Moderate C- Weak D- Moderate E- Strong F- Strong **Global- Moderate**

Strengths and Limitations of the Studies

Overall the quality of the studies identified for this review was poor (see Table 6 for quality ratings). Twenty studies were rated "weak" quality overall using the QAT criteria (Armijo-Olivo et al., 2012). The remaining five quantitative studies (1, 10, 11, 15, 24) were rated as having "moderate" quality. One qualitative study (17) was rated 8 out of 10 using the CASP (2017) criteria.

One limitation of the research examined here, is the lack of a case-control design and the emphasis on recruitment of non-clinical samples. Only five of the studies identified, compared vegetarianism/veganism in ED and non-ED populations (1, 10, 20, 23, 24). In contrast, most studies relied upon online convenience sampling, mainly recruiting females from university and college populations. Samples predominantly comprised small numbers of individuals with eating pathology, and low proportions of the sample identifying as "vegetarian" or "vegan". Whilst a strength of this approach is the relatively low drop-out rates and high overall recruitment rates, such convenience sampling renders it difficult to generalize from these findings about the relationship between vegetarianism and eating pathology.

Another limitation apparent from the studies in this review, is the lack of attention paid to the operationalization of vegetarianism; all but two (17, 23) of the studies relied on self-reported dietary classifications, yet no validated questionnaire to measure vegetarianism/veganism exists. Given the many different vegetarian groupings and subgroupings (see Table 1), most studies were confounded by the fact that they did not provide a definition of what they meant by "vegetarian", or grouped "vegetarian" and "semi-vegetarians"

together. Preliminary results suggested that there were important differences in eating pathology between different dietary subgroups (6, 11) and thus care should be taken to carefully define and classify individuals based on these different dietary groupings.

Moreover, existing research suggests that many individuals who report being vegetarian still report eating meat/fish (de Boer, Schösler & Aiking, 2017). One way to avoid misclassifications is to include a food frequency questionnaire. A strength of seven studies in this review was the use of an additional measure of the frequency different foods were eaten to improve the validity of their dietary classifications (9, 15, 18, 19, 20, 21a, 24).

Most studies (clinical and non-clinical) used multiple measures of eating pathology, employing measures which were established and widely accepted, with acceptable levels of reliability and validity (such as the EDE-Q, Fairburn & Beglin, 1994; EDI-II, Garner et al., 1991). However, eight studies relied upon measures which were problematic in terms of their psychometric properties and/or construct validity (4, 5, 6, 7, 12, 16, 18, 19).

For example, whilst ORTO-15 (Donini et al., 2005) is the most established measure of ON to date, one study (6) questioned the validity of this measure in their research, particularly in distinguishing between pathological and healthy eating patterns. Similarly, whilst the EAT-40 is used in one study in this review (12), this measure includes “enjoys eating meat” as a questionnaire item, conflating eating behaviours which can be explained by vegetarianism rather than eating pathology. Thus, a limitation of these studies is in neglecting

to consider whether measures of eating pathology are valid, reliable or include behaviours considered 'normal' for those adhering to vegetarian/vegan diets.

Discussion

Overall, the research suggests that there is a relationship between ED and adherence to vegetarian diets. Rates of vegetarianism were significantly higher amongst females diagnosed with an ED (10, 20) with higher prevalence of vegetarianism amongst patients who have not recovered from ED compared with those that have (23, 24). Amongst adolescent vegetarians, there is also evidence to suggest higher prevalence of individuals reaching clinical cut-offs for ED (13) with vegetarians more likely to be told by a GP that they have an ED (18) and reporting higher rates of pathological eating behaviours than non-vegetarian individuals (3, 19). Higher rates of disordered eating behaviours have also been reported for vegetarians than non-vegetarians in college (22) and university (12) samples.

Two studies reported contradictory findings though. No differences were found between vegetarian and non-vegetarians on eating pathology measures in an undergraduate (8) or adolescent (7) sample. Findings examining the relationship between eating pathology and vegetarian sub-groups have also been mixed. Some research suggested that semi-vegetarians presented with significantly higher rates of pathological eating behaviour than strict vegetarians (21, 14) whereas vegans reported less eating pathology than other dietary groups (11, 6). More research is needed to examine these differences in dietary subgroups in more detail.

In addition, it is still unclear whether vegetarian diets are associated with specific eating disorders. For example, although Moroze et al. (2015) propose that Orthorexia Nervosa (ON) is a pathological obsession with healthy eating, which can escalate to the elimination of entire food groups, this review highlighted that there is limited evidence to date to suggest that ON is associated with higher rates of vegetarianism. This is likely due to the paucity of research in this area and poor validity of existing measures for ON. Indeed, the majority of studies identified for this review were rated as "poor" quality overall, and thus the results of this review must be interpreted with caution.

However, the existing research provides some evidence for a relationship between vegetarianism and eating pathology, although the temporal ordering, and reasons for this relationship, still remain unclear. In line with Sullivan and Damani's (2000) and Bernard and Levin's (2000) theory, there is some preliminary evidence to suggest that vegetarianism can be used as a method for concealing disordered eating (17) and weight control (1) for some individuals.

This is an important consideration for clinicians in ED settings, highlighting the relevance of gathering information at assessment about onset of vegetarianism, length of adherence to vegetarian diet and motivations for vegetarianism in ED patients. Such information may be useful in developing a more comprehensive formulation of an individual's difficulties, and in understanding the potential role of vegetarianism in the onset and maintenance of their ED. Moreover, in recognising vegetarianism as a potential means of concealing disordered eating, clinicians may be more able to identify individuals

who are using this method of concealment, and thus help these individuals get access to ED services and support.

Strengths and Limitations of this Review

One strength of this review is that it provides a summary of the most recent literature examining the relationship between vegetarianism and ED pathology. In using the PRISMA guidelines (Liberati et al., 2009), this work used a systematic approach to identify peer-reviewed literature in this area. This work is novel in providing a comprehensive overview of evidence for the relationship between eating pathology and vegetarian diets in clinical and non-clinical samples.

Caution must be taken when generalizing from these results though. Many studies relied upon convenience samples recruiting predominantly female college/university students. In addition, most studies employed participant self-ratings of vegetarianism, with many studies providing poor definitions/limited description of how they were defining vegetarianism in their work. Similarly, some ED measures may have conflated vegetarian and 'pathological' eating behaviours, thus over-inflating these associations.

Furthermore, one limitation of this review is the exclusion of grey literature (such as theses and conference proceedings). Inclusion of such materials may have broadened the scope of this search, and reduced the risk of publication bias (Mahood, Van Eerd, & Irvin, 2014). Whilst, eight conference proceedings and two dissertations were identified through our electronic database searches, these additional search yields were beyond the scope of this review.

Moreover, this review uses a broad definition of eating pathology, including studies using many different measures of ED, for example, the EDE-Q (Fairburn & Beglin, 1994) and BES (Gormally, Black, Daston & Rardin, 1982) Studies were included which administered such questionnaires to clinical and/or non-clinical samples. Thus, the diversity of these ED measures may have captured slightly different constructs. Whilst the EDE-Q is considered the "gold standard" for assessment of eating pathology (Luce, Crowther, Pole, 2008, p. 273) the BES focuses specifically on binge eating. Future work may benefit from focusing more specifically on gold standard ED measures, or particular ED diagnostic categories, as well as paying more attention to the differences between clinical and non-clinical samples when examining the relationship between eating pathology and vegetarianism.

Future Research

Whilst the findings from this review suggest that there is a relationship between vegetarianism and disordered eating, the nature of this relationship is still unclear. Thus, this review highlights several important areas for future work. Research with clinical ED samples would benefit from considering the temporal ordering of vegetarianism and the onset of ED in more detail. Furthermore, research in non-clinical/sub-clinical samples which uses case-control designs, diverse samples (including males) and which carefully defines and operationalizes vegetarianism would improve the quality of existing research.

Only one study identified for this review used qualitative methods. Although this study was useful in exploring women's experiences of rationalising their pathological eating behaviours, describing the usefulness of vegetarianism to hide ED dietary restrictions from others, no alternative

experiences or perspectives were identified or described. Thus, qualitative research looking at the motivations for vegetarian diets and the timeline of vegetarianism/ED may be useful here, for exploring ED patients' experiences and perspectives in more depth.

Another important consideration for existing literature is the sole emphasis on strictness/adherence to diet rather than dietary motivations. De Boer et al. (2017) state that the reasons for choosing vegetarianism/veganism may be important when classifying dietary groupings. For example, whilst some vegetarians state health as their motivation, others report their diet is based on ethical factors (Curtis & Comer, 2006). These differences may be key in understanding the relationship between vegetarianism/veganism and eating pathology. Further research which considers, not just dietary group/subgroup, but motivations and reasons for dietary choices (Rosenfeld & Burrows, 2017) would be important in considering whether it is not just the types of food that people eliminate, but the reasons behind food group elimination which may be associated with disordered eating.

Conclusion

Overall this review looked at the existing research examining the association between vegetarianism and disordered eating. A search of four electronic databases and four relevant journals resulted in the inclusion of 26 studies in this review. The majority of findings indicated that there were higher rates of vegetarianism amongst eating disorder patients than controls, and significantly higher rates of self-reported disordered eating amongst vegetarians compared with non-vegetarians in non-clinical samples. However, the research

to date was limited by a lack of case-control design, poor operationalisation of vegetarianism, and an over-reliance on non-clinical (mainly female) populations. Future research would benefit from addressing these limitations, and using qualitative methodology to explore the motivations for, and experiences of, individuals with ED in adhering to vegetarian diets. As de Boer and colleagues (2017) suggest, it is likely that it is not only what foods are restricted, but the reasons for such restrictions that are important.

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Appendix A

Copy of instructions for authors for the nominated journal, Appetite

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- Manuscript has been 'spell checked' and 'grammar checked'
- All references mentioned in the Reference List are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)
- A competing interests statement is provided, even if the authors have no competing interests to declare
- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

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figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file. The corresponding caption should be placed directly below the figure or table.

Appendix B

Qualitative Assessment Tool for Quantitative Studies

QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES

EPHPP
Effective Public Health Practice Project

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

1 Very likely
2 Somewhat likely
3 Not likely
4 Can't tell

(Q2) What percentage of selected individuals agreed to participate?

1 80 - 100% agreement
2 60 – 79% agreement
3 less than 60% agreement
4 Not applicable
5 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

B) STUDY DESIGN

Indicate the study design

1 Randomized controlled trial
2 Controlled clinical trial
3 Cohort analytic (two group pre + post)
4 Case-control
5 Cohort (one group pre + post (before and after))
6 Interrupted time series
7 Other specify _____
8 Can't tell

Was the study described as randomized? If NO, go to Component C.

No Yes

If Yes, was the method of randomization described? (See dictionary)

No Yes

If Yes, was the method appropriate? (See dictionary)

No Yes

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

C) CONFOUNDERS

(Q1) Were there important differences between groups prior to the intervention?

1 Yes
2 No
3 Can't tell

The following are examples of confounders:

1 Race
2 Sex
3 Marital status/family
4 Age
5 SES (income or class)
6 Education
7 Health status
8 Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?

1 80 – 100% (most)
2 60 – 79% (some)
3 Less than 60% (few or none)
4 Can't Tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

1 Yes
2 No
3 Can't tell

(Q2) Were the study participants aware of the research question?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?

1 Yes
2 No
3 Can't tell

(Q2) Were data collection tools shown to be reliable?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?

1 Yes
2 No
3 Can't tell
4 Not Applicable (i.e. one time surveys or interviews)

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell
5 Not Applicable (i.e. Retrospective case-control)

RATE THIS SECTION	STRONG	MODERATE	WEAK	
See dictionary	1	2	3	Not Applicable

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell

(Q2) Was the consistency of the intervention measured?

1 Yes
2 No
3 Can't tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?

4 Yes
5 No
6 Can't tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)

community organization/institution practice/office individual

(Q2) Indicate the unit of analysis (circle one)

community organization/institution practice/office individual

(Q3) Are the statistical methods appropriate for the study design?

1 Yes
2 No
3 Can't tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

1 Yes
2 No
3 Can't tell

GLOBAL RATING

COMPONENT RATINGS
Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

A	**SELECTION BIAS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
B	**STUDY DESIGN**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
C	**CONFOUNDERS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
D	**BLINDING**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
E	**DATA COLLECTION METHOD**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
F	**WITHDRAWALS AND DROPOUTS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	Not Applicable

GLOBAL RATING FOR THIS PAPER (circle one):

1	STRONG	(no WEAK ratings)
2	MODERATE	(one WEAK rating)
3	WEAK	(two or more WEAK ratings)

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No Yes

If yes, indicate the reason for the discrepancy

1 Oversight
2 Differences in interpretation of criteria
3 Differences in interpretation of study

Final decision of both reviewers (circle one):

1 STRONG
2 MODERATE
3 WEAK

Appendix C

Data Extraction Sheet

Reference Number

Title

Author(s)

Source

Date: Vol.: Part: Pages:

Objective

Target group

Setting

Population

Study population

Sampling method

Entry and exclusion criteria

Representative of sample

Size of intervention and control groups

Comparability of intervention and control groups

Outcomes: Measures and Instruments

Timing of measures

Nature of measures

Instruments used

Were instruments validated?

Results

Means and SDs of primary outcomes by group

Attrition (D/O) from study and from intervention and control groups

What statistical tests were used?

Conclusions

Author's conclusions

Reviewer's commentary

Generalisability of findings

Other comments

Appendix D

Critical Appraisal Skills Programme (CASP) Checklist

Retrieved from http://www.casp-uk.net/checklists

10 questions to help you make sense of qualitative research

How to use this appraisal tool

Three broad issues need to be considered when appraising the report of a qualitative research:

- **Are the results of the review valid?**
- **What are the results?**
- **Will the results help locally?**

The 10 questions on the following pages are designed to help you think about these issues systematically. The first two questions are screening questions and can be answered quickly. If the answer to both is "yes", it is worth proceeding with the remaining questions.

There is some degree of overlap between the questions, you are asked to record a "yes", "no" or "can't tell" to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

These checklists were designed to be used as educational tools as part of a workshop setting

There will not be time in the small groups to answer them all in detail!

Screening Questions

1. Was there a clear statement of the aims of the research?

❑ Yes ❑ Can't tell ❑ No

HINT: Consider

- What was the goal of the research?
- Why it was thought important?
- Its relevance

---

2. Is a qualitative methodology appropriate?

❑ Yes ❑ Can't tell ❑ No

HINT: Consider

- If the research seeks to interpret or illuminate the actions and/or subjective experiences of research participants
- Is qualitative research the right methodology for addressing the research goal?

Detailed questions

3. Was the research design appropriate to address the aims of the research? ❒ Yes ❒ Can't tell ❒ No

HINT: Consider

- If the researcher has justified the research design (e.g. have they discussed how they decided which method to use)?

---

4. Was the recruitment strategy appropriate to the aims of the research? ❒ Yes ❒ Can't tell ❒ No

HINT:Consider

- If the researcher has explained how the participants were selected
- If they explained why the participants they selected were the most appropriate to provide access to the type of knowledge sought by the study
- If there are any discussions around recruitment (e.g. why some people chose not to take part)

5. Was the data collected in a way that addressed the research issue? ❑ Yes ❑ Can't tell ❑ No

HINT: Consider

- If the setting for data collection was justified
- If it is clear how data were collected (e.g. focus group, semi-structured interview etc.)
- If the researcher has justified the methods chosen
- If the researcher has made the methods explicit (e.g. for interview method, is there an indication of how interviews were conducted, or did they use a topic guide)?
- If methods were modified during the study. If so, has the researcher explained how and why?
- If the form of data is clear (e.g. tape recordings, video material, notes etc)
- If the researcher has discussed saturation of data

---

6. Has the relationship between researcher and participants been adequately considered? ❑ Yes ❑ Can't tell ❑ No

HINT: Consider

- If the researcher critically examined their own role, potential bias and influence during
  (a) Formulation of the research questions
  (b) Data collection, including sample recruitment and choice of location
- How the researcher responded to events during the study and whether they considered the implications of any changes in the research design

7. Have ethical issues been taken into consideration? ❑ Yes ❑ Can't tell ❑ No

HINT: Consider

- If there are sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained
- If the researcher has discussed issues raised by the study (e.g. issues around informed consent or confidentiality or how they have handled the effects of the study on the participants during and after the study)
- If approval has been sought from the ethics committee

---

8. Was the data analysis sufficiently rigorous? ❑ Yes ❑ Can't tell ❑ No

HINT: Consider

- If there is an in-depth description of the analysis process
- If thematic analysis is used. If so, is it clear how the categories/themes were derived from the data?
- Whether the researcher explains how the data presented were selected from the original sample to demonstrate the analysis process
- If sufficient data are presented to support the findings
- To what extent contradictory data are taken into account
- Whether the researcher critically examined their own role, potential bias and influence during analysis and selection of data for presentation

9. Is there a clear statement of findings?

❒ Yes ❒ Can't tell ❒ No

HINT: Consider

- If the findings are explicit
- If there is adequate discussion of the evidence both for and against the researchers arguments
- If the researcher has discussed the credibility of their findings (e.g. triangulation, respondent validation, more than one analyst)
- If the findings are discussed in relation to the original research question

---

10. How valuable is the research?

HINT: Consider

- If the researcher discusses the contribution the study makes to existing knowledge or understanding e.g. do they consider the findings in relation to current practice or policy?, or relevant research-based literature?
- If they identify new areas where research is necessary
- If the researchers have discussed whether or how the findings can be transferred to other populations or considered other ways the research may be used

SCHOOL OF PSYCHOLOGY

DOCTORATE IN CLINICAL PSYCHOLOGY

LITERATURE REVIEW

What are People's Experiences of Orthorexia Nervosa, as Described in Online Blogs?

Trainee Name:	**Maddy Greville-Harris**
Primary Research Supervisor:	**Dr Janet Smithson**
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	Senior Lecturer, University of Exeter
Target Journal:	Appetite
Word Count:	8426 words (excluding abstract, references and appendices)

Submitted in partial fulfilment of requirements for the

Doctorate Degree in Clinical Psychology, University of Exeter

Abstract

Orthorexia Nervosa (ON) is the term for a proposed new eating disorder, used to describe a pathological obsession with healthy or 'clean' eating. For individuals with ON, the obsession with eating 'healthy' foods, and the elimination of foods considered 'unhealthy' or 'impure', results in impairment to social, physical, occupational and/or other areas of functioning. Whilst there is still debate as to whether ON describes a distinct eating disorder, and there is no consensus around diagnostic criteria as yet, ON is an emerging topic for research, with more cases coming to light both clinically, and in the media.

Although some quantitative research has been carried out in ON, particularly focusing on the measurement and prevalence rates of this proposed disorder, no qualitative studies have been published to date to explore individuals' personal experiences of ON. Thus, for this project, 40 pre-existing blog entries describing first-person experiences of ON from fifteen women bloggers were analysed using thematic analysis. Five key themes were identified: 1) confusion around diagnosis, 2) initial motivations for a healthier lifestyle, 3) fuelling the problem- social influences, 4) when healthy becomes unhealthy…, and 5) avoidance, isolation and compensation.

The clinical implications of these findings were explored, particularly focusing on the social context of ON, diagnostic crossover between ON and other eating disorders, and the role of fear, perfectionism and perceived control. Whilst the debate around the diagnosis of ON continues, these bloggers' accounts

suggest that ON is experienced as a legitimate and debilitating disorder, worthy of clinical and research investigation in its own right.

Keywords: Orthorexia Nervosa, Clean Eating, Eating Disorder, Eating Pathology, Qualitative Research, Thematic Analysis.

Introduction

Societal attitudes towards healthy eating are changing, with increasing emphasis placed on eating good quality or 'clean' foods. A preoccupation with healthy eating is idealised in our society (Simpson & Mazzeo, 2017), with the focus on what, when and how much, to eat becoming "an integral part of social and medical discourse" (Delaney & McCarthy, 2014, p. 105). Thus, 'clean eating', or the strict avoidance of foods considered 'impure' or unhealthy, is an increasingly popular, and arguably dangerous, dietary trend (Nevin & Vertanian, 2017). Unfortunately, claims about the dangers and health benefits of different foods, are now widely disseminated online, through webpages and social media. Such claims can be confusing, with multiple and contradictory messages often circulated without empirical support (Derenne & Beresin, 2017). For example, Paleo and Raw Food diet programs involve the elimination of entire food groups, and have been criticised by healthcare professionals because of their insufficient evidence base (Nevin & Vertanian, 2017).

For these individuals who strictly adhere to these health messages, the obsession with 'clean' eating can become extreme and pathological. The unhealthy obsession with healthy eating can result in "health-related problems and/or impairment in social, occupational, or other significant areas of functioning". (Varga, Dukay-Szabo, Tury & van Furth Eric, 2013, p. 109). This disordered eating style, termed Orthorexia Nervosa (ON) by Bratman (1997), is suggested to be distinct from Anorexia Nervosa (AN), in that it is a pathological obsession with the quality, rather than the quantity of food (Dunn & Bratman, 2016). Whilst ON is a relatively new concept, there has been increasing interest in orthorexia in the media, clinically, and more recently, in research.

However, ON is not yet recognised as a distinct eating disorder (ED) by the International Classification of Diseases (ICD-10; World Health Organisation, 1993) or Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). Indeed, there are still no agreed diagnostic criteria. Moroze and colleagues (2015), Dunn and Bratman (2016), and Barthels, Meyer, Huber and Pietrowsky (2017), have all developed diagnostic criteria (see Appendix A) yet there is still no consensus. Nevertheless, what these authors agree upon, is that ON involves: 1) obsessional preoccupation with 'healthy', 'pure' or 'clean' foods, 2) rigid avoidance of foods considered 'unhealthy' or 'unclean', 3) distress at violation of food rules, and 4) impairment to social, physical and/or psychological wellbeing resulting from these food beliefs and behaviours.

As well as the lack of consensus over diagnostic criteria, there is also debate as to whether ON is indeed a distinct ED, or characterises a stage in ED development or recovery (Barthels, Meyer, Huber & Pietrowsky, 2017). Given the proliferation of health food diets, Segura-Garcia et al. (2015) suggest that ON may represent a more socially acceptable way of controlling and restricting foods, and thus could co-exist with other established eating disorders. Moreover, it has been suggested that ON could be a risk factor for developing an ED (Brytek-Matera, Rogoza, Gramaglia & Zeppegno, 2015) and/or occur as a coping strategy, as a 'healthier way' to control food during ED recovery (Segura-Garcia et al., 2015).

Some researchers have proposed that ON may be a subtype of AN, or not fit into an ED classification at all, instead representing a subtype of Obsessive Compulsive Disorder (OCD) (Koven & Abry, 2015). However, Koven and Abry

(2015) conclude that ON differs from these conditions in several distinct ways (see Figure 1). For example, although OCD and ON both involve obsessions, the nature of these obsessions is very different. Whereas OCD obsessions tend to be ego-dystonic, ON obsessions are ego-syntonic (i.e. in line with the individual's sense of self). Indeed, it is suggested that ON is characterised by a "sense of moral superiority" over individuals who eat foods considered 'unhealthy' (Varga et al., 2013, p. 104). Thus, whilst there are crossovers with other conditions, ON appears to have some distinct characteristics that warrant further investigation.

ON has also been recognised by clinicians as an area necessitating more research. Olejniczak and colleagues (2017) report that in 2003 the National Eating Disorders Association "published official information about orthorexia, emphasizing the need to conduct further research in this area" (p. 544). Vandereycken (2011) collected data from 111 Dutch- speaking ED professionals, comprising mainly psychologists, psychiatrists and physicians using a questionnaire. About two thirds of respondents reported that they had observed ON in their own practice, and believed that ON deserved more attention both in research and clinically. Both these studies have informed the rationale for this study, by highlighting the gap in our understanding of ON, both in terms of how clinicians can formulate and treat it, as well as how it is experienced, defined and diagnosed.

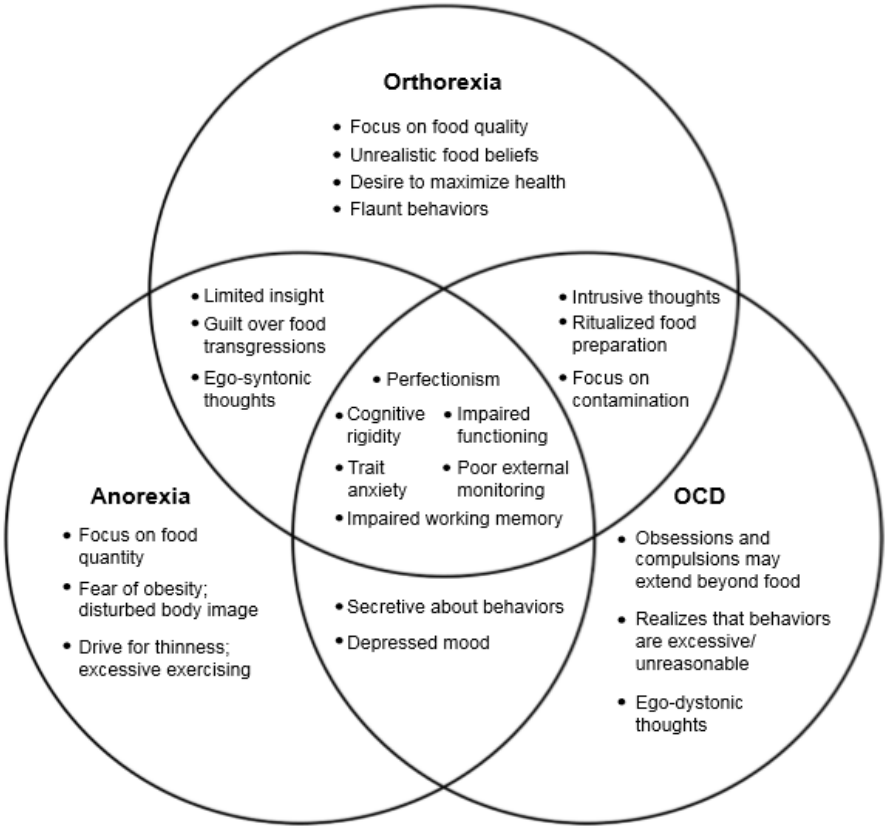

Figure 1. Venn diagram showing unique and overlapping features of ON, AN and OCD. Taken from p. 387, Koven & Abry (2015).

Whilst research into ON is limited, it is quickly expanding. Haman, Barker-Ruchti, Patriksson and Lindgren (2015) carried out a systematic review of ON literature, using three search terms: "Orthorexia", "Orthorexia Nervosa" and "Orthorexic Society". The authors found only 19 peer reviewed publications meeting these criteria, comprising one theoretical article, 15 empirical articles and three case reports. They concluded that ON research so far is "disparate" (p. 12). Similarly, Dunn and Bratman (2016) carried out a review of existing ON literature and concluded that there are currently shortcomings in the measurement tools and prevalence ratings for ON outlined to date. However,

more recently, Missbach and Barthels (2017) found 47 published articles on ON in PubMed, 70% of which were published within the last five years.

Many of the existing studies have looked at prevalence ratings for ON, with estimates in the general population ranging from 6.9% to 57.6% (Koven & Abry, 2015). This variability is likely due to the lack of reliable and standardised measures for ON. Whilst a few questionnaires have been developed - such as ORTO-15 (Donini et al. 2004) and ORTO-11 (Fidan, Ertekin, Sedat & Ismet, 2010) - there is debate about how valid these tools are (Alvarenga et al., 2012). For example, Barnes and Caltabiano (2017) found that the internal consistency of ORTO-15 in their recent study was very low (Cronbach's alpha = .18), resulting in the removal of six of the 15 scale items. Moreover, although the Eating Habits Questionnaire (Gleaves, Graham & Ambwani, 2013) has recently been found to have good psychometric properties (Oberle, Samaghabadi & Hughes, 2017), it is still only recommended as a promising ON screening tool (Oberle et al., 2017).

Costa, Hardan-Khalil and Gibbs (2017) conclude that "while there are some completed literature reviews published, there is still little original research establishing diagnostic criteria, clear symptomology, and effective treatment modalities for ON" (p. 987). Despite the lack of empirical literature to date, ON is an important emerging topic, with many media and clinical cases coming to light. Media interest began in 2014, when a successful and prolific vegan blog writer ("The Blonde Vegan") admitted to her 70, 000 Instagram followers that she had an ED based on the quality of her food intake (Dunn & Bratman, 2016). Since then, many blogs and forums discussing the construct of ON, as well as people's experiences of the disorder, have emerged. These online sources provide a rich

source of data about people's subjective experiences of ON which have so far been widely ignored by ON researchers.

Online resources are potentially useful for ON research. Indeed Bratman (2017) suggests that some existing research looking at ON has mistaken enthusiasm for particular dietary theories as evidence for orthorexia, conflating dietary trends and pathological eating. Bratman (2017) proposes that "those tackling the subject were writing from the outside; they had never lived within the world of alternative eating cultures, and therefore at times seemed to misunderstand them" (p. 382). Exploring online narratives of personal experiences of ON thus allows the researcher to better understand ON from the perspectives of those who have first-hand experience, using pre-existing and naturalistic data.

Moreover, Costa and colleagues (2017) emphasise that whilst there has been some quantitative research looking at ON, there is a lack of qualitative research in this area. Haman (2015) states that this is a gap in the existing ON literature as "research using empirical holistic approaches that involve qualitative studies is necessary to examine individuals' perceptions and experiences of this condition. Future studies should also emphasize a bottom-up perspective and ensure that the voices of individuals are heard" (p. 13). To my knowledge, there are no studies to date which explore the experiences of individuals who identify as having personal experience of ON, seeking to understand their experiences in depth, and in the individual's own terms.

This research seeks to address this gap in the literature, by exploring the personal experiences of ON as described on online blogs. Online blogs refer to

"posts on a common web page, usually written by a single author" (Hookway, 2008, p. 92). Blogs are a useful source of material for qualitative analysis, because they are naturalistic data that are publicly available in text form, allowing access to populations that may be socially or geographically separated from the researcher. According to Hookway (2008) "the anonymity of the online context … means that bloggers may be relatively unselfconscious about what they write since they remain hidden from view" (p. 93). Blogs thus allow the researcher to explore first person-accounts, which have not been created with the researcher's own agenda in mind.

This study thus aims to answer the following research question: What are people's personal experiences of Orthorexia Nervosa, as described in online blogs?

Methods

Based on recent proposed diagnostic criteria for ON (Moroze et al., 2015; Dunn & Bratman, 2016; Barthels et al., 2017), ON is operationalised in this study as an eating disorder involving: 1) an obsessional preoccupation with 'healthy', 'pure' or 'clean' foods, 2) rigid avoidance of foods considered 'unhealthy' or 'unclean', 3) distress at violation of food rules, 4) impairment to social, physical and/or psychological wellbeing resulting from these food beliefs and behaviours, 5) the focus of the disorder is primarily on healthy eating rather than weight loss, and 6) the individual's dietary rules cannot be better explained by another mental or physical health condition.

Data Collection

Data from pre-existing online blogs were collected for this research. Blogs describing personal experiences of ON during adulthood were the focus of this study. Thus, blogs were included if: 1) the blogger was aged 18 or over, 2) the blog described the blogger's personal experiences of orthorexia, 3) the blog was written in English and 4) the blogger used the keyword "orthorexia". Blogs were excluded if the blog described orthorexia from an outsider or expert perspective (without describing personal experiences of ON), or the keyword "orthorexia" was not used (for example the blogger described "clean eating", but did not identify with the label "orthorexia").

Procedure

First, to ascertain whether the proposed research was deemed ethical, feasible and relevant to service users, individuals with experience of ED were contacted through the B-eat Eating Disorder research pool, to provide feedback on the planned research proposal. The B-eat Research Officer, as well as two individuals with lived experience of ED who used internet sites and blogs, provided feedback on the proposed research, particularly the information sheet, debriefing and ethical considerations. These individuals were provided with remuneration for their time and input.

To identify blogs for this research, "orthorexia blog", "my orthorexia story" and "my orthorexia journey" were entered into Google search engine. Blogs retrieved over the first ten pages of search results were then viewed for suitability. Bloggers whose blogs met the eligibility criteria outlined above were

contacted via email or online contact page. These bloggers were provided with an information sheet (see Appendix B) and a link to an online consent form. Thirty-one eligible blogs were identified, and attempts were made to contact their blog authors. Three bloggers did not provide contact details, two declined to take part, one expressed interest but did not give final consent, and ten did not respond. The remaining fifteen eligible bloggers responded via email and gave consent online to include their blog entries in this study.

Table 1 outlines the included blogs, along with the demographic information about bloggers. Demographics were collected by reading the "about me" section of the blog (if present) and then reading blog posts to find any missing information. Identified blogs were then searched with the keywords "orthorexia" and "orthorexic" to ensure that all relevant blog posts within each blog were included. One blogger consented to the use of her supplementary video blog ('vlog') in this study, and thus this was transcribed and added to the data corpus. Forty relevant blog posts (39 written and one video) were thus included from the 15 consenting bloggers (see Table 2). Included blog posts were copied and pasted into Word documents, retaining any graphics, emoticons, punctuation, grammatical errors or spelling mistakes. Data were then imported into NVivo 10 software (QSR International, 2012) for analysis.

Ethical Approval and Considerations

Ethical approval was obtained from the University of Exeter Psychology Ethics Board (Project 2017/1509- see Appendix C). Informed consent was obtained from bloggers before their data was included in this research, and participants were informed of their right to withdraw from the study during the

Table 1

Demographics for Included Bloggers (Excluding Anonymous Bloggers)

Blogger	Gender	Age	Region/Country
B1	Female	22	USA
B2	Female	19	USA
B3	Female	>28	USA
B4	Female	>28	USA
B5	Female	21	India
B6	Female	25	USA
B7	Female	30	Australia
B8	Female	31	USA
B9	Female	20-30	USA
B10	Female	32	USA
B11	Female	27	USA
B12	Female	20- 30	USA

data collection period. Participants were given the option to receive a summary of research findings and were provided with a debriefing form (see Appendix D) once the study had finished.

Initially it was decided that bloggers' identities should be protected by removing all names and identifying information from the data, in line with other researchers in this field (Giles & Newbold, 2011; Kraut et al., 2004). However, one blogger stated that she would like her blog material to be properly cited and identifiable. To respect the bloggers' autonomy and wishes, an amendment to ethical approval was obtained to allow participants the choice to remain anonymous or be cited in the write-up. Twelve bloggers stated that they were happy to be cited/named in this study, one blogger asked to remain anonymous, and two did not respond with a preference (and thus were anonymised in this research). For bloggers who remained anonymous in this report, quotes used in the write-up were not reported verbatim, to ensure that they could not be typed into a search engine and traced back to their original source (Kraut et al., 2004).

Method of Analysis

Because this research aimed to explore experiences of ON, qualitative analysis was deemed most appropriate, as it focuses on how people experience and make meaning in their world. Data from blogs were analysed using thematic analysis based upon Braun and Clarke's (2006) framework. Thematic analysis fits well with a pragmatic approach to qualitative research, whereby the analysis strategy is picked to best answer the research question (Morgan, 2007). Thematic analysis is theoretically flexible, i.e. not associated with any one epistemology (Braun & Clarke, 2006), and allows for meaningful patterns to be

explored within the data (Vaismoradi, Turunen & Bondas, 2013). Although discourse analysis is useful for exploring the ways in which language is used (Hodges, Kuper & Reeves, 2008), and interpretative phenomenological analysis focuses on lived experiences, (Larkin, Watts, & Clifton, 2006), these qualitative approaches are steeped in their own theory (Starks & Trinidad, 2007). Given that ON is a relatively new area of research, the flexibility of thematic analysis allowed a theoretical framework to be applied alongside data analysis, as the research progressed, rather than beforehand (Braun & Clarke, 2006).

Braun and Clarke (2006) stages of thematic analysis were carried out: 1) familiarisation with the data by reading and re-reading the transcripts, 2) generating a list of initial codes of features of interest identified line-by-line in the text, 3) collating codes into themes and reviewing these themes, 4) defining and labelling themes, and 5) selecting illustrative quotes for each theme, and linking findings back to the existing literature.

To ensure that data analysis was coherent and transparent (Yardley, 2000), a clear data trail was kept using elements of grounded theory, such as the use of memos and concept cards (see Appendix E) to record how themes were decided upon (Charmaz, 2006). Deviant case analysis also allowed for contradictory positions and voices to be explored (Mays & Pope, 2000). A second coder (another Clinical Psychology Trainee) also coded four transcripts to ensure consistency in identified themes. Similar codes were identified by both coders, and any discrepancies were discussed and resolved. Throughout data collection, analysis and write-up for this study, quality guidelines for qualitative research,

Table 2

Number of Blog Posts included for each Blog

Source	No. of included blog posts
Anon1	3
Anon2	2
Anon3	2 (including 1 vlog)
addictedtolovely.com	1
autumnbrianne.com	4
Ashley Bailey, http://108squaremiles.com/	5
eatingrules.com/orthorexia/	1
emilyfonnesbeck.com	6
geekie-chic.blogspot.co.uk	1
http://thepurplefig.com/calorie-counting-kept-me-isolated-a-story-about-orthorexia/	1
experiencelife.com/author/kdalebout/	1
maddymoon.com	5
nourisheveryday.com	2
heathercaplan.com/realtalk/	5
winetoweightlifting.com/	1

such as the Critical Appraisal Skills Programme checklist (CASP, 2014) were consulted.

Reflexivity

Although I have no personal experience of ON, I have past experience of disordered eating, which will have shaped my interpretation of the data, and my decision to embark on this project. As a Trainee Clinical Psychologist, I have been interested in trying to understand and formulate people's experiences of their difficulties, and thus my knowledge of different models of formulation, particularly the "Five P's model" (Macneil, Hasty, Conus, & Berk, 2012), undoubtedly influenced the way in which I initially tried to understand each blogger's experience and organise my data codes. I also have a research background in clinical and health psychology, previously carrying out qualitative and quantitative research projects. This has shaped my views about the usefulness of a pragmatic approach to qualitative research (Morgan, 2007).

The lack of empirical evidence in the field of ON, allowed the initial focus of this analysis to be grounded within the participants' experiences, rather than focused on a theory. Nevertheless, existing literature, particularly research outlining proposed diagnostic criteria for ON (Dunn & Bratman, 2016), came to mind throughout the analytical process. As a researcher, I found myself reflecting upon the extent to which these bloggers' experiences conformed with, or did not fit, within these frameworks.

Results

Five main themes comprising eight subthemes were identified in this study (outlined in Table 3). These themes are described in more detail below, using illustrative quotes.

Table 3

Themes and Subthemes Identified in this Analysis

Theme	Subthemes (where applicable)
1) Confusion around diagnosis	
2) Initial motivations for a healthier lifestyle	a) Quest to find what is wrong b) Desire to do right
3) Fuelling the problem - social influences	a) Unhelpful health claims b) Not as it appears… c) Comparisons with others-measuring up to standards?
4) When healthy becomes unhealthy…	a) False sense of control b) A confirmatory cycle of fear and avoidance c) Punishing drive for perfection
5) Avoidance, isolation and compensation…	

Theme 1: Confusion around Diagnosis

Bloggers described the implications of the widespread lack of awareness and official diagnostic criteria for ON. This sometimes resulted in confusion around, and delegitimization of, their disordered eating.

> Real Talk: "For a long time I considered it a mild brush with disordered eating—just a little too "healthy," with good intentions—not something worth sharing. I thought that since I wasn't anorexic or bulimic, it wasn't serious."

For some, this lack of a clear diagnosis, led to uncertainty about whether the ON label was the right one for them.

> Purple Fig: "How do I know if this is orthorexia or just a symptom of being a plus-sized woman in America? Am I orthorexic or just insecure?"

Whilst some bloggers described having no history of mental disorders, eating disorders, or problems with their weight before the onset of ON, others discussed the overlap between ON and other mental health difficulties, particularly EDs. Several described transitions between ON and AN, and thus, their experience of ON was not always clear-cut, transitioning between different ED classifications.

> Ashley Bailey: "I believe my struggle with orthorexia, obsession with healthy eating and having a clean body was morphing into anorexia."

> Experience Life: "At first, I was "just" anorexic, but as my compulsion grew, I quickly transitioned to orthorexia."

Theme 2: Initial Motivations for a Healthier Lifestyle

Quest to find what is wrong. Some bloggers described how initial health problems (often digestive issues) led to a quest to find what was wrong with their bodies, and discover what needed to be 'fixed'. For many this led to experimentation with eliminating certain food groups. Some still experienced symptoms, and so continued with their quest.

> Ashley Bailey: "I have been on an endless search to heal various physical ailments through food elimination and diets... During this same time, I continued to suffer from gastrointestinal issues … So, in my mind, there was still something wrong. There was still something to fix.… The search consumed me."

For others, the initial health benefits for themselves (or their families) of eliminating certain foods spurred them on to continue with their diets. Whilst these initial benefits were not always long lasting, bloggers described the difficulty in reversing these cut backs, believing that something else was 'wrong'.

> ANON: "When I discovered plant-based eating, I could finally eat without feeling nauseous or bloated or my stomach being in pain …Once the detox phase finished, my stomach problems started coming back one at a time. …. After years of eating like this, my diet of plant-based foods no longer satisfied me, so I thought there was something wrong."

Some bloggers sought help from health professionals who recommended elimination diets, or carried out multiple tests. Thus, the quest to fix the problem continued.

> Addicted-to-lovely: "Any spare time I had, I went to see doctors. I went to so many different specialists, I can't even remember all of them."

> Ashley Bailey: "Countless visits to doctors, tests, procedures, herbs, medicines, supplements and thousands of dollars. It's no wonder that my body was unable to recover and reset back to a state of 'normalcy' as it was constantly bombarded by things that it didn't need or couldn't absorb/breakdown…."

Desire to do right. For many bloggers, the start of orthorexia was described as a harmless decision to be healthier, which spiralled into disordered eating. Some described how this initially involved exercising more, calorie counting, or adhering to specific diets such as paleo or plant-based.

> Nourish Everyday: "And so my "health transformation" began. I went from Friday night regulars at Hungry Jacks to making absolutely all my own "healthy food", and I started running and doing as many gym classes as I could squeeze in. A typical day would start with a 6.30am gym class, plus running on the treadmill for 20-30 minutes afterwards, rushing to work, drinking a giant black coffee and sitting down to a bowl of fat free yoghurt and muesli. Yep, I've got this, I thought."

Diet was used to strive for cleanliness, 'health' and in some cases, weight loss. However, ideas around 'health' were often individual and idiosyncratic, shifting over time and becoming more extreme.

> Eating Rules: "I attempted every trend diet under the sun; Atkins, Vegan, Raw Food, Macrobiotics, South Beach, The Zone, and more (sometimes

> shifting from week to week)! Many times these plans were in almost total opposition of each other (think Vegan and Atkins)."

> Experience Life: "When I gained a bit of weight as a college freshman, I began counting calories and adjusted my diet. I transitioned from vegetarian to vegan…After that, I went gluten-free to further "perfect" my diet. Then I decided I'd eat nothing but raw foods, and I quit carbs and sugar, too. Eventually, the only thing left was raw vegetables — and if something didn't fit my rigid diet, I just wouldn't eat at all."

Some bloggers discussed ethical motivations for their dietary decisions. Whilst one blogger described how her passion for eating animal-free products predated ON, for another their vegan diet was initially for health reasons, but messages about the ethical aspects became important over time. The strict elimination of foods resulting from this diet, along with the restrictive mentality, exacerbated her orthorexia.

> ANON: "…having the mindset of really restricting and avoiding foods because of the ethical considerations, the health considerations, it's easier to develop orthorexia".

Theme 3: Fuelling the Problem - Social Influences

Unhelpful health claims. Many bloggers described messages (often on social media) about health and diet which they found unhelpful and fuelled their difficulties. Many explained how the internet, social media and magazines normalised the notion that detoxing, restricting and eliminating foods was healthy.

> Real Talk: "Orthorexia runs rampant on "healthy eating" blogs and Instagram accounts, in cleansing or detoxing programs, and with nutrition "experts" claiming you MUST cut X, Y, and Z out of your diet. All of the above have normalized this fixation on idealizing certain types of food."

Bloggers described how they believed and invested in these fear-based messages, researching how to better achieve 'health', often searching online or in magazines.

> Maddy Moon: "Some magazine, doctor, article, documentary or Instagram post led you to believe that blah blah food is the best food out there, and for whatever reason that little nugget stuck with you and others disappeared…I remember once hearing that store bought yogurt with fruit at the bottom is the worst thing you could eat because of the sugar; for some reason that stuck with me like a tick…."

> Nourish Everyday: "I bought in heavily to the low carb, low fat mantra that dominated popular media, shrinking my diet to controlled portions well under my daily requirements and bulking out meals with plain vegetables. I was scouring every women's mag going, flipping to the diet and lifestyle section and cycling through all of the 1,200-1,500 calorie-per-day meal plans I'd find in there for more ideas."

Not as it appears. For many bloggers, nutrition and wellness was their passion. Several started their own nutrition blogs, shared diet/health pictures on Instagram, or worked professionally advising others on healthy eating. Bloggers stated that things were "not as they appeared". Whilst receiving praise and admiration for their healthy lifestyle, their underlying difficulties often remained hidden unless their weight loss was extreme.

> ANON: "People admire vegans and say they're healthy, and I think to an outsider I looked really healthy, fit, caring about my diet… but mentally I worried about what I ate constantly".

Some bloggers described the realisation that they too began to proliferate the unhealthy messages about health and diet that had first influenced them, and thus the cycle of fear-based messages about food continued.

> Experience Life: "I truly thought I was the picture of health, but that online image wasn't the whole truth."

> Emily Fonnesbeck: "I shudder each time I think about the fact that I was giving nutrition advice to people who trusted me when I was in this state of fear, judgment and disordered eating, or who may have read blog posts I wrote when in a critical mindset."

Comparison with others- measuring up to standards? Bloggers explained how they compared diets, appearance and lifestyle with others, for example with friends, magazine images, or on social media. Some described making upward comparisons about health or weight, leaving them feeling that

they failed to measure up to these standards. These comparisons often led them to instigate more food rules.

> ANON: "I developed ideas about "okay" and "bad" foods based on people I admired. It wasn't just one person or account, but a combination. I believed that if I ate what they ate, I would end up looking like them…"

Others described downward comparisons about health and calorie consumption, leading them to make judgements or criticise other's lifestyle choices. For some, this brought a sense of superiority, that they were doing 'better' at being healthy than others.

> Wine to Weightlifting: "I became super judgmental of anyone that wasn't eating paleo. In fact, I even became judgmental of those who were eating paleo. …. where are your organ meats and fermented foods? Why aren't you brewing bone broth and drinking kombucha? I was not perfect in everything that I was doing, but boy, was it easy to point out that everyone else was doing it wrong**.**"

Theme 4: When Healthy Eating becomes Unhealthy….

A false sense of control. Bloggers described how rules around food and exercise were used to feel in control, as a coping mechanism to feel safe, particularly when other areas of life felt uncontrollable.

> Nourish Everyday: "Being healthy, feeling fresh, fit and in control…that appealed to me big time. It was everything I wasn't really feeling at that point. I wasn't overweight in the slightest, but thought that of course there was much room for improvement."

Bloggers explained that the target of control could change, and thus dietary rules might appear arbitrary, but were constant in serving the same purpose, providing a sense of perceived control for the individual.

> Real Talk: "I didn't know that I would replace counting calories with a low-fat obsession, which I later replaced with a variety of food aversions that transferred the sense of control from one thing to another."

Some described their later realisation that their adherence to rules had brought a 'false sense of control' as their obsession with control ended up controlling them. In so doing, bloggers described ignoring their body's needs, to adhere to their lifestyle 'rules'.

> Ashley Bailey: "I exercised/worked-out twice a day 6-7 days a week for over two years. Even when I was sick. When I was tired. Exhausted. Stressed. In pain. And even shortly after my surgeries. It wasn't a release anymore - it was an addiction. An obsession. But it made me feel in control. Little did I know, it was in fact, controlling me."

A confirmatory cycle of fear and avoidance. Bloggers expressed an intense fear and anxiety about eating certain foods and ingredients, as well as fearing certain food rituals (such as food combining and the timing of eating certain foods) which were considered toxic or dangerous.

> ANON: "Anxiety and fear. Fear of eating toxic ingredients or the "wrong foods" of ingredients that might make me store fat or reduce my lifespan, fear of eating certain foods together, timings of food, food prepared by other people in case they added butter or sugar…."

Some bloggers stated that heightened fear of certain foods increased their physical symptoms, and caused their body to reject these foods.

> Geekie Chic: “I started restricting myself to certain food items only, not because I wanted to be healthier, but because I genuinely believed that those foods would cause me physical and mental harm. I tried to give up eating cheese, butter and milk, and the more I avoided those foods, the more my body would start to reject them.”

Several bloggers believed that their digestive problems were due to physiological responses to anxiety (‘fight or flight’), with increased conviction that certain foods were a threat, exacerbating their physical symptoms.

> Ashley Bailey: “Do you know what physically happens to animal (including humans) when they are in 'fight or flight' mode?... I can't even begin to tell you how much this resonates with me.… I'd like to especially point out the one on digestion and immune system shutting down to allow more energy for emergency functions. Wow, did it ever. Chronic diarrhea and various other immune related symptoms is the main thing that plagued me during this time.”

This led to a vicious cycle, as anxieties around eating certain foods resulted in increased physical symptoms, thus confirming the threatening nature of these foods.

> Emily Fonnesbeck: “… I have a theory … that when we consistently think negative and fearful thoughts about food, our body begins to see it as a threat. Literally. Our immune system encodes it, our digestive tract

> rejects it and our brains see it as a source of anxiety. What was once necessary is now the enemy - physically and psychologically."

Punishing drive for perfection. Many bloggers stated that the need to be 'perfect' drove them to strive obsessively for increasingly unrelenting and unrealistic standards, until their diet and exercise regimes were extreme and debilitating.

> Nourish-everyday: "After a few months though – being a Type A, all-or-nothing perfectionist kind of girl – one or two lifestyle "improvements" weren't enough. Gym times intensified to needing to hit at least 7-8 km on the treadmill each day, plus a class if I could. … I started pretty much walking halfway to and from work. Sweaty, extensive exercise, plus walking, was scheduled in every day, without fail. I needed to do it."

For many, the unrelenting standards and critical self-talk, resulted in a punishing relationship with themselves and their bodies. This involved restriction and deprivation, paradoxically to the detriment of health and wellbeing.

> Autumn Brianne: "I did not know what my "natural" body looked like anymore, because I had manipulated my body for so long. I had abused her. Talked ugly to her. Worked her past her limits. Starved her. Punished her. I had treated myself like someone would treat someone they hated."

These strict food and exercise regimes had serious physical consequences for many bloggers, including extreme weight loss for some, health complaints, difficulty concentrating, exhaustion, vitamin deficiencies and

amenorrhea,

> Ashley Bailey: “After just a few months on a strict vegan diet, along with the loss of muscle and disruptive cognitive function, I also developed cystic acne, my eyes become very bloodshot surrounded by dark circles, I was extremely fatigued, I had headaches, my hair was dry, and I become more depressed and increasingly irritable.

Theme 5: Withdrawal Avoidance and Compensation….

Lapses in adherence to dietary rules would often result in intense feelings of guilt and shame, leading to compensatory strategies to ‘make up for’ eating the ‘wrong’ foods.

> Purple Fig: “The days I stray from this menu bring torrents of anxiety and guilt. A chocolate bar will force me to run an extra mile the following afternoon and alcohol will cause me to not eat for a day.”

> ANON: “When I ate a food that was against my self-imposed rules I would make myself do a work out and reduce all fat intake for a week.”

Many bloggers also described how their strict food rules resulted in social isolation, a breakdown in relationships and withdrawal from activities (particularly events involving food) as the healthy regime was prioritised above all else.

> Nourish Everyday: “As I became more controlling, I noticed a major shift in the way my friends treated me. Initially, they made efforts to (delicately) encourage me to relax, to go out more. But the longer I persisted and the more I locked myself into my routine, the more difficult it became. Eventually, my friends just started leaving me out of things like parties….

> I'd isolated myself by the choices I had made with my exercise and food commitments."

> Maddy Moon: "… I tried to do all that I could to avoid going out to eat, or eating anywhere that wasn't my kitchen…. Every time somebody asked me to go out to eat for dinner, something would "come up" unexpectedly."

Discussion

This study explored bloggers' personal experiences of Orthorexia Nervosa (ON) as described in their online accounts. Five key themes were identified: 1) confusion around diagnosis, 2) initial motivations for a healthier lifestyle, 3) fuelling the problem- social influences, 4) when healthy becomes unhealthy…, and 5) avoidance, isolation and compensation. This section discusses key topics arising from these themes, the strengths and limitations of this research and the clinical implications of these findings.

Confusion Around Diagnosis

In this study, bloggers described the lack of awareness and official diagnosis of ON, causing confusion, and sometimes delegitimization, of their experiences. These narratives mirror the uncertainty around diagnostic criteria for ON in the literature, the lack of recognised diagnosis within the DSM-5 (American Psychiatric Association, 2013), and perhaps the lack of awareness of ON in the general population. Although no studies have examined awareness of this term ("orthorexia") in the UK or USA, preliminary research in Poland suggested that ON was largely unrecognised, with 71% of young people surveyed (n = 981) reporting that they did not know what orthorexia was (Olejniczac et al., 2017).

Furthermore, bloggers reflected upon different trajectories into ON. For some ON was their first, and only, experience of disordered eating. Others reported experiences of crossover between different EDs (for example, transitioning from AN to ON, or vice versa). Indeed, whether there is diagnostic crossover between ON and other EDs, and the nature of this relationship, is a source of some debate. For example, whilst the proposed motivation for ON is stated as health rather than weight (i.e. the quality rather than quantity of food), Bratman (2017) acknowledges that this distinction can be problematic, as notions of 'health' can come to incorporate ideas about weight and weight loss.

During their lifespan, individuals with ED are recognised to crossover between different ED diagnoses, for example moving from AN to BN or vice versa (Tozzi et al., 2005; Eddy et al., 2008). Similarly, the ON literature suggests that ON could be a gateway into (or out of) another recognised ED. ON is proposed as a 'healthier' means to control food during ED recovery (Segura-Garcia et al. 2015) as well as a risk factor for developing a more 'severe' ED (Brytek-Matera, Rogoza, Gramaglia & Zeppegno, 2015). Considering these diagnostic crossovers, one debate within the ON literature is whether ON is, or should be recognised as, a separate eating disorder (Barnes & Caltabiano, 2017; Bratman, 2017; Koven & Abry, 2015). Whilst more research is needed to understand these different ED trajectories, in this study, ON was not described as merely a recovery stage from another ED, but rather as a difficulty that was severe, distinct and debilitating enough to be investigated, both in relation to other disorders, and in its own right.

The Social Messages Promoting ON

This research also highlighted the importance of the current social climate in fuelling these bloggers' difficulties. Bloggers described how social messages about health and diet from the internet, social media and magazines normalised fear-based ideas about food, and encouraged the notion that detoxing, restricting and eliminating foods was the healthiest choice. For these bloggers, fear-based and idealised messages about diet online, were described as promoting their orthorexic behaviours. In addition, some bloggers reflected upon their own proliferation of these fear-based messages on social media, further fuelling these restrictive and extreme ideals.

The relationship between social media and EDs more generally is widely established (Park, 2005). Yet much of this work has focused on the influence of thin ideals on EDs (Bessenoff, 2006; Bissell & Zhou, 2004; Harrison, 2001; Thomsen, Weber & Brown, 2002). However, the experiences of many of these bloggers suggested that the focus of ON was on ideals around health and avoiding illness, rather than thinness per se. Whilst this focus is in line with the proposed diagnostic criteria for orthorexia (Barthels et al., 2017; Dunn & Bratman, 2016; Moroze et al., 2015) it differs from other established EDs, and warrants further investigation.

Social Comparison- a "Disease Disguised as a Virtue"?

As well as social messages about health, bloggers in this research reflect on the hidden nature and social acceptability of their ON. These women described how their disordered eating remained unnoticed by many unless weight loss was extreme. In addition, many described receiving praise and

admiration for their lifestyle. Some admitted to an outward appearance of health and wellbeing, when in reality “things were not as they appeared”. Social comparison, both online, and in person, was outlined as key to their experience. Some bloggers described making judgements of other’s lifestyle choices, feeling superior in being healthier than others. Yet, at other times bloggers expressed how upward comparisons about health or weight, left them feeling inadequate or failing.

These narratives are in line with the descriptions of ON in the literature. ON has been postulated to be an ego-syntonic disorder (Varga et al., 2013) resulting in a sense of superiority for the individual, intolerance of other’s food beliefs or the flaunting of one’s own habits (Alvarenga et al. 2012; Koven & Senbonmatsu, 2013). In addition, ON has been described as a “disease disguised as a virtue” (Bratman & Knight, 2000, p. 2) as an obsession with the promoted idea of ‘healthy eating’. Whilst our research is the first to outline upward comparison and feelings of inadequacy in ON, the contrasting narratives of social acceptability may be particularly important in understanding how ON can go unnoticed, remain hidden, or indeed be promoted as something to aspire to.

Fear, Control and Perfectionism

Bloggers explained how their initial quest to become healthier, or to eliminate health problems through their diet, became extreme over time, resulting in disordered eating. Three key components of their experiences were described: a confirmatory cycle of fear and avoidance, a false sense of control, and a punishing drive for perfection.

Confirmatory cycle of fear and avoidance. Participants expressed an intense fear about eating certain foods, and of certain food rituals, considered toxic or dangerous. Some participants described how their anxieties around eating certain foods resulted in increased physical symptoms, thus confirming the threatening nature of these foods. Fear and avoidance are described as a part of Barthel et al.'s (2017) proposed diagnostic criteria for ON. Moreover, the role of fear and avoidance of foods is recognised in the development of other EDs such as AN (Strober, 2004). However, the physical symptoms resulting from eating feared foods, and the confirmatory nature of these symptoms in verifying the food as 'dangerous' have not been explored in the ON literature to date. Examining the relationship between these factors in ON thus deserves further empirical investigation.

A false sense of control. Many bloggers also described how rules about food and exercise were used to feel in control. Participants described the realisation, that in the end, their need for control was controlling them. Within the ON literature, perceived control has not been explored, nor is it outlined by any of the existing diagnostic criteria (Barthel et al., 2017; Dunn & Bratman, 2016; Moroze et al., 2015). However, similar accounts about perceived control are found within the ED literature more broadly (Dignon, Beardsmore, Spain, & Kuan, 2006; Reid, Burr, Williams, & Hammersley, 2008). In qualitative studies, individuals with ED have described how controlling food serves as a coping mechanism when other areas of their life feel out of control (Dignon et al., 2006), as well as describing ambivalence as to whether they controlled their ED, or it controlled them (Reid et al., 2008). These narratives are in line with those

described by bloggers in this study, and highlight the potential importance of perceived control for individuals with ON.

A punishing drive for perfection. Bloggers also outlined the importance of perfectionism in their experiences of ON. Their narratives explored how the need to be 'perfect' drove them to strive obsessively for increasingly unrelenting and unrealistic standards, until their diet/exercise regimes were extreme and punishing. These accounts are in line with preliminary research in ON. Barnes and Caltabiano (2017) carried out a questionnaire study with 220 participants which found that higher self-reported perfectionism was significantly correlated with higher levels of reported orthorexic symptoms. Moreover, it is recognised in ED research more broadly that higher levels of perfectionism are significantly associated with eating disorder pathology (Bardone-Cone et al., 2008; Cockell et al., 2002; Forbush, Heatherton & Keel, 2007; Pike et al., 2008). The experiences of these bloggers suggest that like other EDs, perfectionism may play an important role in ON.

Strengths and Weaknesses of this Study

A strength of this study was that it prioritised the subjective experiences of individuals who identify with the label of ON, allowing a better understanding of this construct from first person accounts. To date, no qualitative research has been published in this area (Costa et al., 2017) and thus a criticism of ON research is its reliance upon self-report questionnaires with limited validity (Barnes & Caltabiano, 2017). This research thus allowed for a richer exploration of people's experiences, using bloggers' pre-existing accounts to explore their own narratives.

However, the blogs identified in this research were written by women only, many of whom worked in roles to promote health and wellbeing (such as dieticians, life coaches and yoga teachers). The decision to use blogs, captures the experience of those willing to share their experiences in the public domain, and thus those who do not use the internet in this way, remain unheard. Therefore, the voices of individuals who experience ON from within less health-oriented professions, and those of men, are not captured by this sample. Although initial research is mixed, several studies have suggested that there are no gender differences in orthorexic symptoms between men and women (Barnes & Caltabiano, 2017; Brytek-Matera, Donini, Krupa, Poggiogalle & Hay, 2015; Varga, Thege, Dukay-Szabo, Tury F & van Furth, 2014). Therefore, it is important for future research to explore the narratives and perspectives of men as well as women.

Moreover, bloggers in this sample were recruited if they self-identified as having experienced ON, yet there is still confusion around what ON is, and how it differs from other EDs. Thus, it is difficult to tell: 1) whether these participants would fit existing criteria for ON, 2) the severity and these bloggers' disordered eating, and 3) the nature of comorbidity with other EDs/mental health difficulties. Future research would thus benefit from development of accepted criteria for describing ON, and focusing upon participants' past and present ED status using validated measures. Moreover, research situated within an ED setting may be useful to explore the clinical severity of ON, and the diagnostic crossovers between ON and other EDs.

In terms of the data analytical strategy for this research, thematic analysis was a useful and accessible method for identifying themes within the data using an established framework for analysis (Braun & Clark, 2006). The additional use of concept cards allowed for some transparency in the data trail for this analysis, in line with Yardley's (2000) criteria for quality assessment in qualitative research. However, more extensive use of a reflexive diary may have been useful in allowing a more transparent reflection on the role and influence of the researcher's decision-making process and preconceptions on the analytical process.

Furthermore, whilst the bloggers received a copy of this report, participant validation of these findings did not take place, whereby bloggers feedback their thoughts and reflections on the research findings. This may have been a useful step in establishing whether bloggers felt the themes identified in the data reflected some of their experiences of ON, and thus help provide further additional insight and interpretation of developing themes (Burnard, Gill, Stewart, Treasure & Chadwick, 2008).

Clinical Implications

Whilst there is debate as to whether ON is a distinct pattern of disordered eating or not (Barthels, et al., 2017), this research suggests that bloggers describe their experiences of ON as a distinct ED in that its focus is primarily on health rather than weight loss. The themes identified from this research highlight many crossovers with the proposed diagnostic criteria for ON (Moroze et al., 2015; Dunn & Bratman, 2016; Barthels et al.,2017) such as excessive preoccupation with healthy eating, fear and avoidance of 'unhealthy' foods, and

physical and or functional impairment resulting from disordered eating behaviours. These criteria differ from other established EDs due to their health focus.

These bloggers' accounts suggest that ON is experienced as a legitimate, and debilitating condition, which can crossover with other EDs, and/or be experienced as a distinct disorder. This research suggests that regardless of whether ON is considered a separate diagnosis or not, the potential physical, psychological and social impact of ON affords its legitimacy as an area for future clinical and research focus. These findings are in line with Vandereycken's (2011) research, which indicated that two thirds of ED professionals had seen cases of ON in their practice and believed that ON deserved more attention.

This research also highlights the importance of mapping out cycles of fear, avoidance and physical symptoms with clients with ON, as well as considering the ideas about health and disease (and not just thin ideals). These accounts may be particularly relevant in highlighting areas that are important to consider in formulating and understanding people's experiences of ON, and ultimately identifying how these factors may maintain a client's orthorexic behaviours.

Furthermore the importance of perfectionism and control are useful in developing an understanding, formulation and treatment plan for individuals with ON. Models of perfectionism in EDs have been developed (Shafran, Egan & Wade, 2010) and recommendations have been proposed for the assessment and early treatment of perfectionism in clinical settings (Egan, Tracey & Shafran, 2011). In addition, treatment models focusing specifically on the role of control in the context of EDs have been developed and implemented with promising results

(Lynch et al., 2013). Our research suggests that these existing models, may perhaps be usefully adapted and applied as a framework for understanding and treating ON.

Conclusion

This study used thematic analysis to explore bloggers' experiences of ON, focusing on issues around diagnosis, social context, motivations for pursuing a healthy lifestyle, and the role of fear, perfectionism and control. Overall these bloggers' accounts highlight many potential areas for future research, including: 1) the link between social media use and orthorexia, 2) the relationship between perceived control, perfectionism and ON, 3) the potential for physical symptoms to exacerbate food-based fears in ON, and 4) experiences of ON recovery. Future research exploring the accounts of males with ON, as well as the perspectives of those seeking treatment in clinical settings would be helpful to explore possible ED diagnostic crossovers in more detail.

Overall, this research suggests that whilst it is unclear whether ON is indeed a distinct condition, for some bloggers their difficulties occurred without adherence to thin ideals, or history of other eating disorders. This suggests that ON is indeed worthy of more clinical investigation. Future work may benefit from exploring recovery and treatment pathways for ON, perhaps incorporating factors key to these bloggers' narratives such as ideas of health and disease, as well as incorporating the more established models of fear and avoidance, perfectionism and control. Whilst the debate around the diagnosis of ON continues, these bloggers' accounts suggest that ON is experienced as a legitimate and separate disorder worthy of attention in research and beyond.

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Appendix A

Proposed Diagnostic Criteria for ON

Table 1

Proposed Diagnostic Criteria for ON

Author	Criterion	
1. Moroze et al., 2015, p. 401)	A	Obsessional preoccupation with eating 'healthy foods,' focusing on concerns regarding the quality and composition of meals. (Two or more of the following): • Consuming a nutritionally unbalanced diet owing to preoccupying beliefs about food 'purity.' • Preoccupation and worries about eating impure or unhealthy foods and of the effect of food quality and composition on physical or emotional health or both. • Rigid avoidance of foods believed by the patient to be 'unhealthy,' which may include foods containing any fat, preservatives, food additives, animal products, or other ingredients considered by the subject to be unhealthy. • For individuals who are not food professionals, excessive amounts of time (e.g., 3 or more hours per day) spent reading about, acquiring, and preparing specific types of foods based on their perceived quality and composition. • Guilty feelings and worries after transgressions in which 'unhealthy' or 'impure' foods are consumed. • Intolerance to other's food beliefs. • Spending excessive amounts of money relative to one's income on foods because of their perceived quality and composition.
	B	The obsessional preoccupation becomes impairing by either of the following: • Impairment of physical health owing to nutritional imbalances, e.g., developing malnutrition because of an unbalanced diet. • Severe distress or impairment of social, academic, or vocational functioning owing to obsessional thoughts and behaviours focusing on patient's beliefs about 'healthy' eating.
	C	The disturbance is not merely an exacerbation of the symptoms of another disorder such as obsessive-compulsive disorder or of schizophrenia or another psychotic disorder.
	D	The behaviour is not better accounted for by the exclusive observation of organized orthodox religious food observance or when concerns with specialized food requirements are in relation to professionally diagnosed food

		allergies or medical conditions requiring a specific diet
Dunn & Bratman's Criteria, 2016, p. 16.	A	Obsessive focus on 'healthy' eating, as defined by a dietary theory or set of beliefs whose specific details may vary; marked by exaggerated emotional distress in relationship to food choices perceived as unhealthy; weight loss may ensue as a result of dietary choices, but this is not the primary goal. As evidenced by the following: • Compulsive behaviour and or/mental preoccupation regarding affirmative and restrictive dietary practices believed by the individual to promote optimum health. • Violation of self-imposed dietary rules causes exaggerated fear of disease, sense of personal impurity and/or negative physical sensations, accompanied by anxiety and shame. • Dietary restrictions escalate over time, and may come to include elimination of entire food groups and involve progressively more frequent and/or severe 'cleanses' (partial fasts) regarded as purifying or detoxifying. This escalation commonly leads to weight loss, but desire to lose weight is absent, hidden subordinated to ideation about healthy eating.
	B	The compulsive behaviour and/or mental preoccupation becomes clinically impairing by any of the following: • Malnutrition, severe weight loss, or other medical complications from restricted diet. • Intrapersonal distress or impairment of social, academic or vocational functioning secondary to beliefs or behaviours about healthy diet. • Positive body image, self-worth, identity and/or satisfaction excessively dependent on compliance with self-defined 'healthy' eating behaviour.
Barthels et al., 2017, p. 271	A	Enduring and intensive preoccupation with healthy nutrition, healthy foods and healthy eating
	B	Pronounced fears as well as extensive avoidance of foods considered to be unhealthy according to subjective belief
	C	At least two overvalued ideas concerning the effectiveness and potential health benefits of foods. AND/OR: Ritualised preoccupation with buying, preparing and consuming foods, which is not due to culinary reasons but stems from overvalued ideas. Deviation or impossibility to adhere to nutrition rules causes intensive fears, which can be avoided by a rigid adherence to the rules
	D	The fixation on healthy eating causes suffering or impairments of clinical relevance in social, occupational or other important areas of life and/or negatively affects children (e.g., feeding children in an age-inappropriate way) AND/OR: Deficiency syndrome due to disordered eating behaviour. Insight into the illness is not necessary; in some cases the lack of insight might be an indicator for the severity of the disorder

E	Intended weight loss and underweight may be present, but worries about weight and shape should not dominate the syndrome

Appendix B

Participant Information Sheet and Consent Form

Information sheet about our study- what are people's experiences of, and attitudes towards, Orthorexia Nervosa?

What is the research about?

Orthorexia Nervosa is a disorder whereby the individual becomes obsessed by proper nutrition of 'clean eating', resulting in restrictive diet, and avoidance of food thought to be impure or unhealthy (Koven & Abry, 2015; Dunn & Bratman, 2016). Although clinical cases of Orthorexia Nervosa are reported, very little is known about this disorder. This research aims to explore Orthorexia Nervosa in more detail, in order to learn about experiences of, and attitudes towards this disorder. It aims to examine online forum and blogs about Orthorexia Nervosa and 'clean eating' in order to better understand people's attitudes and experiences first hand.

What will happen if I decide to take part?

If you decide to take part in this study, you will be asked to give consent that you agree for your blog/forum to be included in this study. There will be no other involvement needed for this research to take place.

The researchers will then copy and paste the pre-existing text from your blog/forum threads into our study database along with data from other participating blogs/forums. All of your identifying information will be removed from the text before it is analysed. We will then carry out a qualitative analysis of the forum threads/blog text. This means that we read all of the data and look for recurring themes across all of the forum threads/blogs in our database. Our analysis will look for broad themes across all of the data that we use in the study, to examine different experiences and attitudes towards Orthorexia Nervosa. We will then write up our findings in a report, which will include examples of the kind of text we read in the blogs/forums.

Why have I been invited?

You have been invited to take part because you write an online blog or own/facilitate an online forum which includes description of experiences of, or attitudes towards, Orthorexia Nervosa or 'clean eating'.

Do I have to take part?

Taking part in this study is completely voluntary. If you do decide to take part, you can also withdraw without penalty from the study at any time during the data collection period (up until end of August 2017). If you do withdraw from the study, we will remove your data from our study database.

Are there any possible risks involved?

We will be writing up a report that includes examples of text from blogs/forums. In order to ensure that your confidentiality is maintained, we will remove all identifying information from our report, including blog names, forum and forum user names.

If you are a blog author, and would rather that we cited your work directly, or included your blog name please let us know, as we are happy to include your details in our research if you would prefer.

We will store any identifying information separately from our data, and all information and data will be stored on a password protected computer. Data will then be stored securely for 7 years at the University before being destroyed. We will also ensure that we change the wording of any quotations that we use in our report, in order to stop people from being able to search for your blog/forum online when reading our research.

What are the benefits of taking part?

This research will help us to understand people's experiences and attitudes towards Orthorexia Nervosa and obsessive 'clean eating'. This area of research is still relatively new, and the findings will help to gain more understanding of this important subject.

How do I take part?

If you would like to take part in this research, please email Dr Maddy Greville-Harris at M.Greville-Harris@exeter.ac.uk.

What if there is a problem?

This research has ethical approval from the psychology ethics board. If there is a problem you can contact the researcher for this study by email at: M.Greville-Harris@exeter.ac.uk. If you have any questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you can contact the chair of the Ethics Committee, Dr Lisa Leaver, Psychology, University of Exeter via email (l.a.leaver@exeter.ac.uk) or telephone (01392 724641).

Will my taking part in the study be kept confidential?

All data for this study will be stored on a University of Exeter password protected computer. Data will be secured securely at the University of Exeter for 7 years before being destroyed. None of the results from this study will have any identifiable information in it, and all of the personal identifying information in the blogs/forums will be kept securely and separated from the data used for analysis before the data analysis takes place.

What will happen to the results of the research study?

The results of this research study will be written up as part of the doctorate degree in Clinical Psychology of the main researcher (Maddy Greville-Harris) at the University of Exeter. The findings from the study will be used for publication or educational purposes. Any information that we use will not identify anyone who took part in the study. A summary of the results will be available from June 2018. Please email the researcher M.Greville-Harris@exeter.ac.uk if you would like to receive a summary of the results for this study.

Who is organizing and funding the research?

This research is being carried out at the University of Exeter. The project will count towards the researcher's doctorate in Clinical Psychology.

References

Dunn, T. M., & Bratman, S. (2016). On orthorexia nervosa: A review of the literature and proposed diagnostic criteria. *Eating Behaviors*, *21*, 11–17.

Koven, N. S., & Abry, A. W. (2015). The clinical basis of orthorexia nervosa: emerging perspectives. *Neuropsychiatric Disease & Treatment*, *11*, 385-394.

Statement of Consent

I give my informed consent to participate in this study: **what are people's experiences of, and attitudes towards, Orthorexia Nervosa?**

I have read and understood the information form provided. I understand that the information on the blogs/forums will be kept confidential and that a final report will be written up for publication. I understand that I can withdraw from this study without penalty until the data collection period finishes (May 2017).

Questions or concerns about the study can be addressed to the Chair of the Ethics Committee, Dr Lisa Leaver School of Psychology, University of Exeter via email (l.a.leaver@exeter.ac.uk) or telephone (01392 724641).

Investigator name: Maddy Greville-Harris

Participant Name:

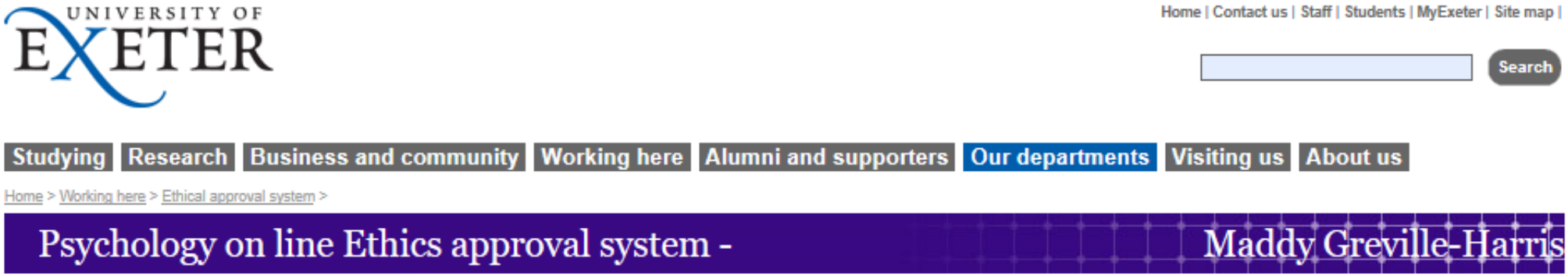
Blog/forum name:

Date:

Signature/mandatory tick box.

Appendix C

Ethical Approval



Your applications

2017/1509	Maddy Greville-Harris	What are people's experiences of, and attitudes towards, Orthorexia Nervosa?	conditional acceptance	17/01/2017	Track B

Conditions of acceptance: It would be worth seeing whether the references in the debriefing information are actually publically available, and including only these. It might be frustrating for participants if they are not.

Appendix D

Debriefing Form

Information sheet about our study- what are people's experiences of, and attitudes towards, Orthorexia Nervosa?

Thank you for taking part in our study. This research aimed to explore Orthorexia Nervosa and 'clean eating' and how they were described online, in order to learn about experiences of, and attitudes towards Orthorexia/ 'clean eating'. It examined online forum threads and blogs about Orthorexia Nervosa and 'clean eating' in order to better understand people's attitudes and experiences first hand. We collected data from lots of different forums and blogs, and looked for recurrent themes across all the data. The findings from this study will be written up as part of the researcher's doctorate in Clinical Psychology, and also for publication as a journal article. If you would like to receive a summary of the results from this study, please email: M.Greville-Harris@exeter.ac.uk.

If you have any further questions, please contact me, Dr Maddy Greville-Harris, at email: M.Greville-Harris@exeter.ac.uk. If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Dr Lisa Leaver School of Psychology, University of Exeter via email (l.a.leaver@exeter.ac.uk) or telephone (01392 724641).

For more information about research in this area, there are some research papers:

Dunn, T. M., & Bratman, S. (2016). On orthorexia nervosa: A review of the literature and proposed diagnostic criteria. *Eating Behaviors*, *21*, 11–17.

Haman, L., Barker-Ruchti, N., Patriksson, G., & Lindgren, E. C. (2015). Orthorexia nervosa: An integrative literature review of a lifestyle syndrome. *International Journal of Qualitative Studies on Health and Well-Being*, *10*, 1-15.

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Moroze, R. M., Dunn, T. M., Craig Holland, J., Yager, J., & Weintraub, P. (2015). Microthinking About Micronutrients: A Case of Transition From Obsessions About Healthy Eating to Near-Fatal "Orthorexia Nervosa" and Proposed Diagnostic Criteria. *Psychosomatics*, *56*(4), 397–403.

Appendix E

Example Concept Card

Theme 4	**False sense of control**
Description	Using eating as a way of feeling in control when other areas of your life feel out of control. But it is a "false sense of control" and ends up controlling you. Bloggers describe losing control of their obsession with control!! In doing so, bloggers describe ignoring their body's needs and cues. bloggers describe how control allows her to feel safe/secure "comfort zone". While it may start as a choice, it spirals out of control. Bloggers identify that their difficulties are not really about food at all, but about the false sense of control and coping mechanisms that they are using. Both a "demon" and a "friend", ON as a coping mechanism to feel safe, in control. As serving a purpose. Reasons vary for each person.
Links with other themes	Links with exercise, restriction/deprivation, perfectionism. Feeling safe. MERGED WITH 'COPING STRATEGY' theme
Examples	Life happens. And for the most part, the majority of things in our lives, are out of our control. And generally, that is OK. Expected. And accepted. But, there are those times that things go completely awry. And then there or those times when go not only awry, but devastated by trauma. When an event takes place that derails your life to the point where you feel out of control, you latch on to things that make you feel in control. Back in fall of 2010, I had series of life events that left me feeling dis-empowered, helpless and completely out of control. I latched onto three main things that enabled me to *feel* in control. Hence the word feel, in the end, these things controlled me. I didn't actually *have* control. Though, I started to use exercise in such a way that it actually stressed my body in times where I truly needed emotional support and rest. I exercised/worked-out twice a day 5-6 days a week for over two years. Even when I was sick. When I was tired. Exhausted. Stressed. In pain. And even shortly after my surgeries. It wasn't a release anymore - it was an addiction. An obsession. But it made me *feel* in control. Little did I know, it was in fact, controlling me. Truly though, the disordered eating isn't the problem, it's the beliefs, life experiences and painful emotions that are alleviated by controlling food and their body in this way. Provide them opportunities to work through their cognitive distortions to gain confidence in being who they truly are What happened next was all my own doing (the doctor was extremely kind and well intentioned!). *What do I like doing?* I went away and thought about it, looking for something to work toward. Being healthy, feeling fresh, fit and ***in control***…that ***appealed to me big time***. It was everything I wasn't really feeling at that point. I wasn't overweight in the slightest, but thought that of course there was much room for improvement.

	Well folks, as I have said in previous posts, ***it doesn't have anything to do with food***. These thoughts and behaviors rear up on their hind legs when things in my life feel out of control and I am frightened or uncertain (aka fear of the unknown). Food is something I can control - of course this is a false sense of control because it actually ends up controlling me. I touched on this in my previous posts on Orthorexia. SEVERAL QUOTES REMOVED FOR ANONYMITY

Appendix F

Dissemination Statement

Blog writers that take part in this research will be offered the opportunity to receive a copy of the results of the study should they wish to do so. Results will also be shared with the service user advisors involved in the study design, and will also be submitted to the B-eat eating disorder website for dissemination on their eating disorder research page. Both the literature review and empirical paper will be written up for publication and submitted to Appetite (impact factor 3.125) or Eating Behaviors (impact factor 1.962), as ON research falls within the scope of these journals, and ON work has been published by them previously.

Appendix G

Copy of instructions for authors for the nominated journal, Appetite

GUIDE FOR AUTHORS

Your Paper Your Way

We now differentiate between the requirements for new and revised submissions. You may choose to submit your manuscript as a single Word or PDF file to be used in the refereeing process. Only when your paper is at the revision stage, will you be requested to put your paper in to a 'correct format' for acceptance and provide the items required for the publication of your article. To find out more, please visit the Preparation section below. INTRODUCTION Types of article Full length papers Full length papers including empirical reports and theoretical reviews are published. Reviews may be of any length consistent with succinct presentation, subdivided as appropriate to the subject matter.

Special Sections or Issues Proposals for a themed collection, symposium or commentary should be sent to the Contact Editor and appetite@elsevier.com, listing provisional authors, titles and lengths of papers and suggesting Executive, Advisory or Guest Editors with a timetable for recorded peer reviewing, revision and transmittal in the format required for publication. The reviews or reports in a special section or issue will be subject to the normal process of peer review.

Please note that questionnaires and interview protocols (in Figure form) are not published. Contact details for submission Authors should submit their articles electronically at: http://ees.elsevier.com/appetite/. Submission checklist. You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:

- E-mail address
- Full postal address

All necessary files have been uploaded: Manuscript:

- Include keywords
- All figures (include relevant captions)
- All tables (including titles, description, footnotes)
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- Indicate clearly if color should be used for any figures in print Graphical Abstracts / Highlights files (where applicable), Supplemental files (where applicable)

Further considerations

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- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer review process. As part of the Your Paper Your Way service, you may choose to submit your manuscript as a single file to be used in the refereeing process. This can be a PDF file or a Word document, in any format or layout that can be used by referees to evaluate your manuscript. It should contain high enough quality figures for refereeing. If you prefer to do so, you may still provide all or some of the source files at the initial submission. Please note that individual figure files larger than 10 MB must be uploaded separately. Appetite has published an editorial with guidelines on design and statistics, which authors are encouraged to consult.

References

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

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There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions. If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes. Divide the article into clearly defined sections. Please ensure your paper has consecutive line numbering, this is an essential peer review requirement. Figures and tables embedded in text Please ensure the

figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file. The corresponding caption should be placed directly below the figure or table.